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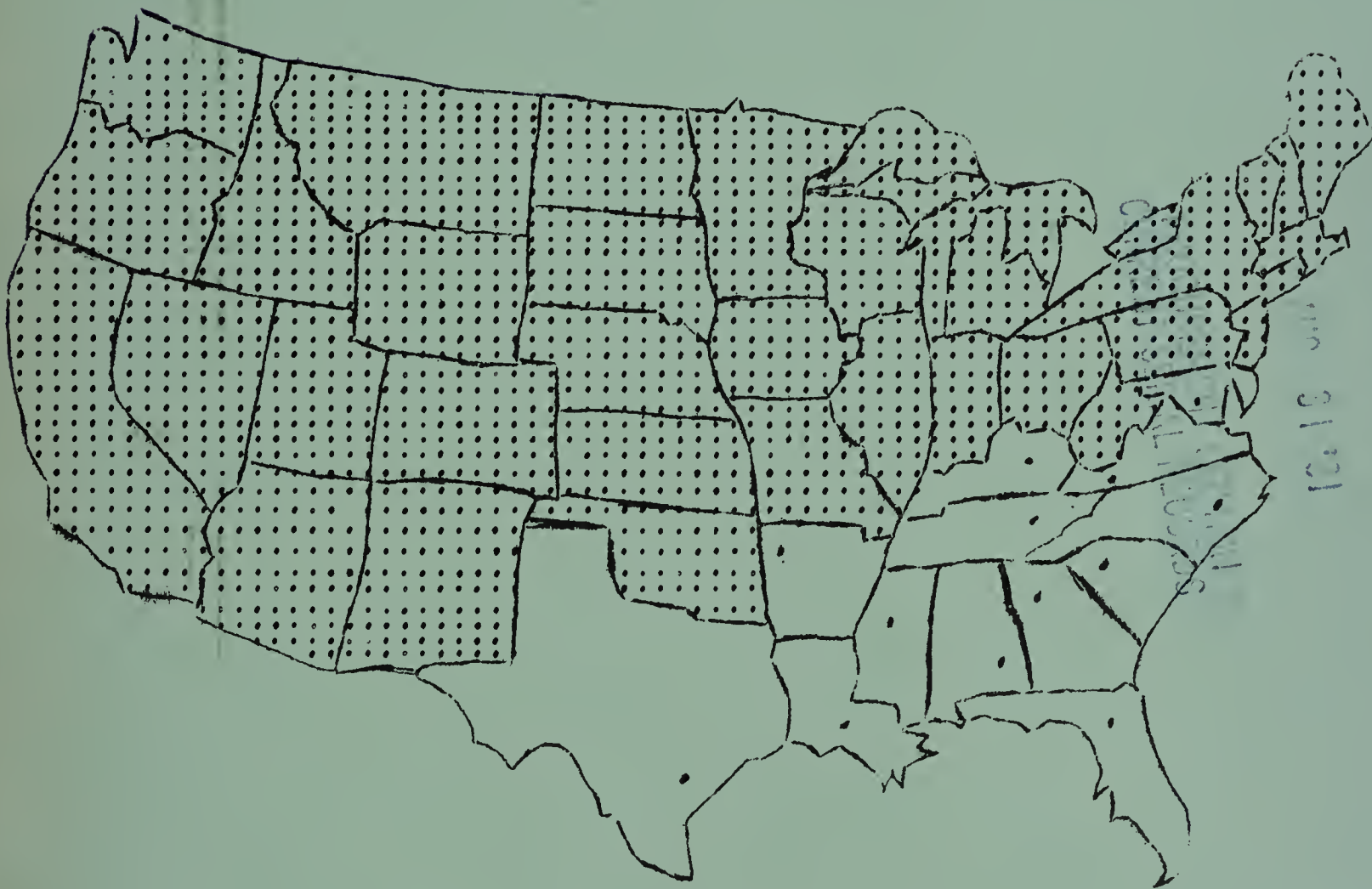
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U. S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE  
ANIMAL AND POULTRY HUSBANDRY RESEARCH BRANCH  
AND  
COOPERATING SOUTHERN STATES

1955 Annual Report of  
S-10  
IMPROVEMENT OF BEEF CATTLE  
FOR THE SOUTHERN REGION THROUGH BREEDING METHODS

January 1, 1956



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This is a report submitted by project leaders of Project S-10 "Improvement of Beef Cattle for the Southern Region Through Breeding Methods", and compiled by the Regional Coordinator. It is intended for use of administrative leaders and workers in developing the project, and is not for general publication.





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## INTRODUCTION

- by -

Charles M. Kincaid

The material in the state reports, which make up most of this report, has been prepared by station project leaders. It summarizes research developments at each station. Many of the data included are of a preliminary nature and the report is not, therefore, for general distribution or publication.

This project was initiated in 1948 and is designed to gather information on the problems of breeding more productive beef cattle for the South. Detailed annual reports similar to the present one have been prepared each year since 1950. These earlier reports have given material on history, objectives, and early research results. A very limited number of earlier reports for years 1950 through 1954 is available. Persons receiving this report and not having copies of the older ones can obtain those available by writing to C. M. Kincaid, 110 McCord Hall, University of Tennessee, Knoxville, Tennessee, as long as the supply lasts.

### Scope of Project and Developments During Year

As of July 1, 1955, there were 4802 cows of breeding age (2 years old and older) in the project. A total of 9811 cattle contributed data and included in addition breeding cows and heifers 336 bulls, 3271 calves, 1353 yearling heifers and 191 steers. During the winter (1954-55) performance tests were completed on 630 young bulls, 544 heifers and 285 steers. In addition to these specific performance tests data were obtained that furnished growth and type score information in all calves up to weaning and on all replacement heifers. Compared to the preceding year the number of breeding cows increased by 7 per cent while the number of animals on performance tests remained about the same.

Thirteen Southern states and the United States Department of Agriculture are now actively cooperating in the project. Experimental cattle are maintained at 33 experiment stations and substations in the area. Thirty of these are state owned, while three are federally owned. These latter three stations at Jeanerette, Louisiana; Brooksville, Florida; and Front Royal, Virginia, are in each case operated cooperatively with the state in which located. Additions to facilities including land, buildings and equipment were reported by nine of the thirteen cooperating states.

The Kentucky station developed a contributing project during the year which calls for feed lot testing of bulls owned by cooperating breeders. These feed lot tests will be followed by progeny testing some of the bulls on grade cows to study the relation of feed lot performance of sires to feed lot and grazing performance of the progeny. Fifteen young bulls are on test; four of these will be progeny tested.

The continuing and apparently increasing problem of dwarfism, both among pure-bred and commercial cattle in the Southern area and in experiment station herds led to the initiation of research on this problem at five stations, namely: Florida, Louisiana, Tennessee, Texas and Virginia during the past year. Mention of the specific problems being studied will be found in each of the station reports.



### Project Results

The results by the individual stations show the accomplishments at each station more or less in detail. Some of the highlights of the station reports were as follows:

Further study of data at Virginia station from progeny tests with fast and slow gaining sires over a six year period indicated that heritability of growth rate was in the neighborhood of  $1/3$ . The data showed general agreement in rate of gain before and after weaning and indicated that weaning weight could be used to evaluate the breeding value of sires if cows were assigned in a way that averaged out maternal influences on suckling calves. Heritabilities of feeder grade at weaning, slaughter grade after 200 days on full feed and carcass grade estimated from half sib correlations among steers fed out were 0.49, 0.53 and 0.16, respectively.

At the Texas station recent estimates of the heritability of growth rate ranged from 0.21 to 0.57. At this station progeny tests of fast, intermediate and slow gaining bulls showed the gain of progenies in general agreement with relative differences among their sires. A study of the relationship between birth weight, weaning weight and feedlot gain showed positive correlations and indicated that each of these characteristics were measuring, at least in part, somewhat the same thing.

At the Tennessee station, differences in level of nutrition to 18 months of age produced marked differences in weight, fatness, and type scores within trios of half sibs initially selected for uniformity. In general, differences in apparent type and weight evident at 18 months of age disappeared by the time the animals were four years old.

Studies were continued at the Maryland station in which feed intake of individually fed animals was partitioned into that used for growth and that for non-growth (maintenance). The TDN requirement for maintenance was higher than in 1954 also showed differences between the sexes within year and sire group weaned at 90 days of age. For steers the relationship was weight raised to about 0.6 power from 90 to 174 days and approximately 1.0 after 174 days. For heifers the relationship was near 1.0 from 90 to 118 days about 0.5 at 230 to 258 days after which it increased to 0.8 to 0.9. A preliminary study of growth curves of calves at the Maryland station suggested that growth was essentially linear from 90 to about one year of age.

In the Texas work a study of the carcass of straight bred Herefords and Hereford x Brahman crosses showed little or no difference for most of the observations except those relating to fill and dressing percentage. The higher dressing percentage of the crossbreds (2.7%) appeared to result from less fill (2.0%) and less weight in the GI tract (0.7%). In cutting tests each side of the same carcass gave essentially the same results. In a comparison of carcasses from young bulls and steers the same age, the bulls compared favorably to the steers in juiciness, tenderness and flavor.

The Romo-Carolina strain developed at North Carolina continued to produce calves with heavy weaning weights. Calves sired by Africander and Brahman bulls continued to show better adaptation than those sired by Herefords to rather rigorous environmental conditions imposed by high humidity, hot temperatures, and often swampy conditions in the Tidewater Area of North Carolina.

At the South Carolina Station a comparison of crossbred calves involving crosses between two British breeds and crosses between Brahman and British breeds showed crossbred calves approximately 50 pounds heavier at weaning than straight bred Angus and Herefords. Calves from crosses between the two British breeds showed essentially the same weaning weights as those from crossing Brahman with British breeds.



In Louisiana work involving productivity of four kinds of cows and six kinds of bulls gave results in general agreement with the previous year. Brangus dams weaned heavier calves than Brahman, Angus or Herefords. The Charolaise bull again sired calves that weaned heavier than those sired by Angus, Hereford, Shorthorn, Brahman, and Brangus bulls. At 18 months of age heifers from Brahman dams were heavier than those from the other three kinds for the 1953 and also the 1954 calf crop while those sired by Brahman bulls ranked fifth among the six kinds of sires. Carcass information on the steers slaughtered after finishing on small grain pasture and limited concentrates showed Angus, Hereford and Shorthorn crossbreds grading approximately one-half a grade higher than Brangus and Brahman with Charolaise in between. Differences in dressing percentages were small with the Charolaise highest and British crossbreds lowest but tenderness (shearing strength) favored the British breeds.

The Georgia station summarized published studies which provided comparisons of British with British x Brahman crossbreds with respect to performance of calves and  $F_1$  dams. Crossbred calves averaged seven pounds (10%) heavier at birth and 30 pounds (8%) heavier at weaning than straight breeds, while the latter gained faster (6%) and required less feed (12%) per pound of gain in the feed lot. The crossbred  $F_1$  cows showed better survival of calves to weaning and weaned calves approximately 23% heavier.

Heat tolerance studies at Bluebonnet Farm (Texas) showed significant differences in the summer between animals on pastures with and without shade. Heritability of heat tolerance was estimated at 19%. Studies of blood constituents continued at the Texas station in an effort to find compounds with levels related to gaining ability were inconclusive. Protein bound iodine, serum alkaline phosphatase and glutathione seemed to offer possibilities, but need further study.

The relationship of sale price to certain measures of merit for performance tested bulls sold at auction by the Arkansas station indicated that conformation score influenced the price more than gain in the feedlot, weight at the time of sale or feed consumption, but all four factors seemed to influence market value.

Major points of interest in the investigation of dwarfism were as follows:

- (1) In Florida observations of different forms of dwarfism turned up a large variety of dwarf types in the various breeds and strains of beef cattle in that state. The breeds and strains included: Angus, Hereford, Shorthorn, Brahman and combinations of these breeds as well as native cattle. The Florida and Louisiana stations have obtained a number of animals for breeding tests to clarify the genetics of different types.
- (2) At the Tennessee station x-ray pictures of lumbar vertebra were taken on each calf in the progeny of several different carrier bulls. These calves were classified as carrier and non-carrier according to techniques developed by Hazel and Emmerson of Iowa State College. Body measurements and other observation were used to develop a discriminant function for possible identification of carriers. The number of calves classified as carrier and non-carrier were about equal but sharp discontinuity between photographs from carrier and non-carriers was not observed. It appeared that there was overlap of the distribution of carrier and non-carrier. A discriminant function was developed which agreed well with the classification from x-ray photographs.
- (3) Blood analysis at the Texas and Virginia stations showed protein bound iodine and phosphatase activity similar in dwarf and normal calves. At the latter station bioassay for gonadotropic activity of anterior pituitary material and detailed necropsies of dwarf and normal calves gave negative results. In



agreement with other studies, the long bones of dwarf calves were shorter and relatively thicker than those from normals of the same age.

### Interest of Public in Project

The last annual report pointed out that statewide performance testing programs in Texas and Virginia had resulted as a direct outgrowth of the work of this project. The Texas Association is now contemplating extension of their program to a national basis. The Virginia program has developed into a formal association under the name "Virginia Beef Cattle Improvement Association." To be eligible to enter this program a breeder must include all calves in the herd. Over seventy breeders with approximately 2500 calves and 300 yearlings participated in 1955. In at least three other states in the region steps have been taken toward the establishment of performance testing programs. The demand for performance tested bulls seems to exceed by far the small supply of gain tested animals available. The continued interest and support of programs that test potential breeding animals on feedlot gain evaluation tests is further evidence of the influence of this work.

Public interest in the project was further emphasized during the year by the following events:

- (a) Two television and radio shows dealing with the work in two different states were shown over area networks.
- (b) Several consignment sales of bulls in one state had the bulls offered for sale officially graded prior to the sale. This was a type grade but the grading committee considered size as a factor in the grade.
- (c) Large crowds attended several field days and auctions sales where research information was presented and tested bulls sold. Prices paid for these bulls indicated that performance on test influenced what they brought.
- (d) Project leaders in several different states have reported numbers of requests from breeders regarding methods and procedures needed to evaluate performance of animals in their herds.

### Future Plans

Most of the projects are of long time nature and general changes in them are not contemplated.

The several states studying the problem of dwarfism expect to follow up leads they have obtained. It is hoped that sufficient progress will be made in a relatively short time with this problem so that personnel and facilities may be used for work of the more fundamental long range nature.

PERSONNEL of the S-10 PROJECT

\*\* STATE AGRICULTURAL EXPERIMENT STATION WORKERS \*\*  
 (asterick indicates Technical Committee Members)

Alabama	*W. M. Warren, W. D. Salmon . . . . .	Auburn, Ala.
Arkansas	*Warren Gifford, C. J. Brown. . . . .	Fayetteville, Ark.
Florida	*Marvin Koger, A. C. Warnick. . . . .	Gainesville, Fla.
	W. G. Kirk . . . . .	Ona, Fla.
Georgia	*B. L. Southwell, W. C. McCormick . . . . .	Tifton, Ga.
Louisiana	*Richard A. Damon, Jr.. . . . .	Baton Rouge, La.
Maryland	*J. E. Foster, W. W. Green. . . . .	College Park, Md.
Mississippi	*C. E. Lindley, L. C. Ulberg, Ralph Boulware. .	State College, Miss.
North Carolina	*E. U. Dillard, John H. Gregory . . . . .	Raleigh, N. C.
South Carolina	*E. G. Godbey, W. C. Godley . . . . .	Clemson, S. C.
Tennessee	*C. S. Hobbs, H. J. Smith, R. P. Moorman, Joe W. High, Jr. . . . .	Knoxville, Tenn.
Texas	*Bruce L. Warwick, T. C. Cartwright . . . . .	McGregor, Tex.
	R. E. Patterson, H. O. Kunkel. . . . .	College Station, Tex.
	A. A. Melton . . . . .	Balmorhea, Tex.
	F. H. Sims, J. P. Smith. . . . .	Panhandle, Tex.
Virginia	*George W. Litton, R. C. Carter, T. J. Marlowe, J. S. Copenhaver, J. C. Taylor. . .	Blacksburg, Va.
	Martin Burris. . . . .	Front Royal, Va.
	Roy Hammes . . . . .	Middleburg, Va.

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B. M. Priode, Supt., Beef Cattle Research Station . . . . .	Front Royal, Virginia
M. W. Hazen, Acting in Charge, Chinsegut Hill Sanctuary. . . . .	Brooksville, Florida
Cal Burns, Chinsegut Hill Sanctuary. . . . .	Brooksville, Florida

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R. E. Patterson, Administrative Advisor. . . . .	College Station, Texas
Bruce L. Warwick, Chairman . . . . .	McGregor, Texas
R. A. Damon, Jr., Secretary. . . . .	Baton Rouge, Louisiana
Warren Gifford, Executive Committee Member . . . . .	Fayetteville, Arkansas

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ALABAMA STATION

- by -

W. M. Warren

January 1, 1956

I. Project Title: (Ala. 525)

Improvement of Performance of Beef Cattle Through Mass Selection

II. Objectives:

- (1) To determine the effectiveness of mass selection for total performance in beef cattle.
- (2) To develop criteria for evaluating and selecting breeding animals.

III. Accomplishments during the year:

- (1) Acquisition of facilities: A D-8 Bulldozer was acquired for land clearing purposes.
- (2) Improvement of facilities: Land clearing, pasture development and improvement of existing pastures was continued during the year.
- (3) Research results: The third calf crops in the Angus and Hereford lines and the second calf crop in the Shorthorn line were born during the year. Data collected on these calves include birth weight, weaning weight and weaning score. These calves are now on 150-day post weaning performance test.

The 154-day post weaning performance test was completed on 50 bulls (10 Angus, 2 Brahman, 2 Santa Gertrudis, 13 Hereford, 11 Polled Hereford and 12 Shorthorn) and 38 heifers (5 Angus, 22 Hereford and 11 Shorthorn) during 1955. 82 bulls and 40 heifers have already been started on the 1955-56 Performance Test.

The better performing heifers from the 1954-55 Performance Test were placed in the breeding herds.

Two Shorthorn bulls tested in 1954-55 are on loan to a Substation for progeny testing.

IV. Future Plans:

- (1) Improvement of Facilities: Reclamation of land, seeding of pastures, erection of hay sheds and improvement of handling facilities will be continued as rapidly as possible.
- (2) The proposed revision of the existing project planned for 1955 has been postponed until next year because of reproductive difficulty in the Shorthorn line. The plan to broaden the project to include research on the influence of heterosis on rate of gain, carcass quality and cow performance and to obtain additional information on selection procedures will be inaugurated as soon as reproduction in the Shorthorn line will permit.

The experiment with laboratory rats initiated in 1954 is being continued to study the effectiveness of different methods of selection.

## POSTWEANING PERFORMANCE OF 1954 CALVES FULL FED AFTER WEANING

Alabama Station

Line or group designation	Angus	Brahman	Santa Ger- trudis	Hereford	Shorthorn & P. Shorthorn	Polled Hereford
Location	Auburn	Auburn	Auburn	Auburn	Auburn	Auburn
Av. inbreeding (%)	Outbred	Outbred	Outbred	Outbred	Outbred	Outbred
<b>Bulls, No.</b>	10	2	2	13	12	11
Av. age on test (days)	297	370	304	337	351	347
Av. wt. on test	590	679	800	736	769	767
Av. wt. off test	947	1017	1175	1083	1110	1139
Length of feeding period	154	154	154	154	154	154
Feed per cwt. gain (lbs.)						
Concentrates	657)	All bulls - - - - -				
Roughage	354)					
Av. daily gain on test	2.32	2.20	2.44	2.26	2.22	2.43
Av. type score (off test)	11.67	12.50	13.00	11.75	12.20	11.50
<b>Steers, No.</b>	7			8	4	
Av. age on test (days)	410			378	391	
Av. wt. on test	640			546	531	
Av. wt. off test	1000			901	832	
Length of feeding period	154			154	154	
Feed per cwt. gain (lbs.) <sup>1/</sup>						
Concentrates	686)	All steers - - - - -				
Roughage	327)					
Av. daily gain on test	2.34			2.31	1.95	
Av. type score (off test)	14.00			13.50	12.00	
Animals slaughtered						
Av. age at slaughter	564			532	545	
Av. slaughter weight	1000			901	832	
Av. slaughter grade	14.00			13.50	12.00	
Av. dressing percent	61.22			59.83	59.53	
Av. carcass grade	14.00			13.70	11.90	
<b>Heifers, No.</b>	5			22	11	
Av. inbreeding (%)	Outbred			Outbred	Outbred	
Av. age on test (days)	417			292	400	
Av. wt. on test	604			471	541	
Av. wt. off test	818			685	793	
Length of feeding period	154			154	154	
Feed per cwt. gain (lbs.)						
Concentrates	511)	All heifers - - - - -				
Roughage	630)					
Av. daily gain on test	1.39			1.37	1.63	
Av. type score (off test)	10.80			12.15	13.18	

<sup>1/</sup> Group fed mixed ration consisting of 10% ground alfalfa, 10% molasses, 15% cotton-seed meal, 65% ground Coastal Bermuda hay free choice.

Av. daily ration: 15.4 lb. concentrate; 7.3 pound roughage.



## PERFORMANCE OF COW HERDS. 1955 CALVES

Alabama Station

Line or group designation Location Breed of sire Breed of dam No. cows bred	Angus Auburn Angus Angus 29	Hereford Auburn Hereford Hereford 60	Shorthorn Auburn Shorthorn Shorthorn 23
No. cows calving No. calves raised Av. inbr. of dams (%) Av. inbr. of calves (%)	28 28 Outbred Outbred	52 47 Outbred Outbred	9 9 Outbred Outbred
Av. birth date	11-23-54	12-19-54	1-16-55
Av. birth wt. (lbs.): Bulls Heifers	56 (15) 54 (13)	64 (26) 58 (26)	68 (4) 60 (5)
Were calves creep fed?	No	No	No
Av. wt. at six months (lbs.): Bulls Steers Heifers	-- -- --	-- -- --	-- -- --
Av. weaning date: Bulls Steers Heifers	7-30-55	8-26-55	9-23-55
All weaned at 250 days			
Av. weaning wt.: Bulls Steers Heifers	546 (9) 477 (6) 479 (13)	516 (14) 437 (11) 415 (22)	530 (3) 438 (2) 386 (4)
Av. weaning type score: Bulls Steers Heifers	12.6 10.8 13.0	12.3 11.0 11.7	13.0 11.0 11.0
Av. weaning condition score: Bulls Steers Heifers	12.2 10.5 13.0	12.0 10.7 11.5	12.3 11.0 11.0

## ARKANSAS STATION

- by -

C. J. Brown

January 1, 1956

## \* INTRODUCTION \*

Purebred Aberdeen-Angus, Herefords, and Shorthorn cattle are managed as a single herd at the Main Experiment Station and a herd of Aberdeen-Angus is maintained at the Livestock and Forestry Branch Station. Pasture breeding was practiced and calves were dropped in both spring and fall seasons. Calves are weaned at seven months of age. Except in special cases calves were not castrated until weaning or until after completion of the R. O. P. test. All females were kept for replacement and after weaning were pastured or fed to make normal growth which is recorded as part of the Arkansas contributing project to S-10.

I. Project Title:

The Determination of Adequate Records of Performance Tests for Beef Cattle

II. Objectives:

To develop practical, but adequate, methods for evaluating the breeding worth of beef sires and dams which would include the following:

- (a) A system of measuring variations in young animals and the values of such measures in predicting variations in the same animals at more mature ages.
- (b) Methods of measuring and evaluating the records of performance of brood cows.
- (c) The determination of the kind of records and number of progeny necessary to prove beef sires.

III. Accomplishments during the year:

- (a) Twenty-three Angus, fourteen Hereford, and five Shorthorn heifers at the Main Station and ten Angus heifers at the Livestock and Forestry Station, born since September 1, 1954, have been kept in the herds for replacement and increase in cow numbers. One Hereford bull and one Shorthorn bull was purchased for herd sire additions to the herds. Approximately twenty-five acres of land has been cleared of brush for pasture development. Approximately 125 acres of pasture was fertilized and seeded to a small grain and grass mixture with a grass land drill. Approximately two miles of permanent type fence was built. A new brush type mower was purchased and an ensilage chopper leased for use on this project.

At the Livestock and Forestry Station approximately thirty-five acres of land has been cleared of brush for pasture development. Approximately fifteen acres seeded to Bermuda and one mile of permanent type fence built.

Fourteen young bulls were fed on a 154 day post weaning performance test for cooperating breeders.



Twenty-one performance tested bulls were made available to breeders through an auction held as a part of a study day on the breeding of more productive beef cattle.

(b) The following research has been completed or is in progress:

Forty-six bulls were fed individually for 154 days to obtain measures of gain and feed efficiency.

Growth, as indicated by weights and body measurements, were recorded on all young and mature animals.

All cattle were classified for type by a committee of four judges.

Analysis of data already collected was continued.

#### IV. Future Plans:

Cooperate with the Extension Service in the initiation of a production testing program for cow herds in the state.

Continuation of studies of milk production in beef cattle.

Continuation of individual feeding of bull progeny of sires and the feeding of steer and heifer groups when possible.

Study differences in rate and efficiency of gain of performance-tested bulls in terms of their ability to digest the test ration.

Continuation of study of growth and development of all animals.

Continuation of classification study.

Continuation of the long time development of lines within the herds.

#### V. Publications:

Brown, C. J., Maurice L. Ray, and Warren Gifford. 1955. Relation of Sale Price to Certain Measures of Merit in Performance Tested Bulls sold at Auction. (Abst.) Jour. Ani. Sci. 14:1176.

#### VI. Publications Planned:

Brown, C. J., E. J. Warwick, H. J. Smith, W. W. Green and H. A. Stewart, Relationships between Type Scores and Live Animal Measurements of Beef Cattle (submitted to Journal of Animal Science).

Brown, C. J., Maurice L. Ray, and Warren Gifford. Growth and Development of Hereford Cattle (submitted as Station Bulletin).

Brown, C. J., Maurice L. Ray, and Warren Gifford. Growth and Development of Aberdeen-Angus Cattle, (submitted as Station Bulletin).

# PERFORMANCE OF COW HERDS. 1955 CALVES

Arkansas Station

Line or group designation	McLean-dolier	Barman	Alf.Pr.Eric	P.E. 195	Nobleman	Uark FL Dom 221	FL Anxiety 1	Duke
Location	I&F Sta.	Main Sta.	Main Sta.	Main Sta.	Main Sta.	Main Station	Main Station	Main Sta.
Breed of sire	Angus	Angus	Angus	Angus	Shorthorn	Hereford	Hereford	Hereford
Breed of dam	Angus	Angus	Angus	Angus	Shorthorn	Hereford	Hereford	Hereford
No. cows bred	29	30	25	7	13	17	20	5
No. cows calving	29	30	25	7	13	17	20	5
No. calves raised	28	28	25	7	12	16	19	5
Av. inbr. of dams (%)	0	2.2	2.4	1.7	0	0	0	0
Av. inbr. of calves (%)	0	1.9	1.0	1.0	5.8	6.4	0	0
Av. birth date	12-24-55	11-26-55	11-19-55	1-5-55	10-15-54	12-6-54	10-22-55	9-21-55
Av. birth wt. (lbs.):								
Bulls	61(18)	59(12)	60(17)	57(3)	68(6)1/	72(12)	78(9)	66(2)
Heifers	66(10)	56(16)	59(8)	57(4)	70(6)	73(4)	70(9)	58(3)
Were calves creep fed?	No	No	No	No	No	No	No	No
Av. wt. at six months (lbs):								
Bulls	376(15)	343(9)	338(16)	355(1)	294	353(11)	386(7)	415(1)
Steers	---	375(3)	285(1)	319(2)	275	---	372(3)	328(1)
Heifers	351(10)	316(16)	338(8)	331(4)	265	314(4)	332(9)	267(3)
Av. weaning date:	7-24-55	6-26-55	6-19-55	8-5-55	5-15-55	7-6-55	5-22-55	4-21-55
Av. weaning wt.:	All calves weaned at the age of seven months - - - - -							
Bulls	403(12)	382(8)	393(16)	384(1)	351(5)	409(10)	451(7)	490(1)
Steers	---	408(3)	340(1)	361(2)	330(1)	295(1)	443(3)	385(1)
Heifers	404(10)	360(16)	374(8)	371(4)	310(6)	367(4)	396(9)	368(3)
Av. weaning type score:								
Bulls	70	68	67	61	66	65	68	71
Steers	--	66	--	72	70	63	65	62
Heifers	72	67	71	68	62	71	67	71
Av. weaning condition score:								
Bulls	68	66	65	62	67	65	68	71
Steers	--	66	--	68	70	59	67	65
Heifers	69	65	68	66	61	66	65	69

1/ Number of animals used to calculate average



POSTWEANING PERFORMANCE OF 1954 CALVES FULL FED AFTER WEANING  
(or pastured for high gains)

Arkansas Station

Line or group designation	Coop.10	FL Anx- iety	Heref.	Hereford	Coop.2	Nobleman	Barman	Alf.Pr.Eric	McLean- doller	Coop.1A	Coop.1B
Location	Angus	Heref.	Heref.	Hereford	Heref.	Shorthorn	Angus	Angus	Angus	Angus	Angus
Breeding of calves	Angus	Heref.	Heref.	Hereford	Heref.	Shorthorn	Angus	Angus	Angus	Angus	Angus
Bulls, No.	4	62/	4	4	3	3	4	101/	5	4	3
Av. weaning wt.	394	448	421	421	711	344	393	378	412	411	462
Av. 12 mo. wt.	739	786	728	728	1011	694	739	724	728	792	803
Len. of feeding period	154	154	154	154	154	154	154	154	154	154	154
Feed per cwt. gain(lbs.)	855	992	921	921	1255	960	1012	934	1067	811	855
Concentrates	570	662	614	614	837	640	665	623	711	541	570
Roughage	285	330	307	307	418	320	337	311	356	270	285
Av. da. gain on test	2.24	2.19	2.15	2.15	1.95	2.27	2.24	2.24	2.05	2.47	2.24
Av. type score (12 mo.)	68	70	71	71	73	70	725/	70	76	73	68
Steers, No.											
Av. weaning wt.											
Av. 12 mo. wt.											
Len. of feeding period											
Feed per cwt. gain(lbs.)											
Concentrates											
Roughage											
Av. da. gain on test											
Av. type score (12 mo.)											

- 1/ Average figured on 8 bulls which had completed test
- 2/ Average figured on 5 bulls which had completed test
- 3/ Initial test weight taken at approximately 240 day which was about 30 days after weaning
- 4/ Final test weight taken at approximately 13 months of age
- 5/ Scores based on Arkansas classification system which given an average animal a numerical value of 65 on a scale which ranges from 30 to 100.



## FLORIDA STATION

- by -

Marvin Koger

January 1, 1956

I. Objectives:

- (a) To determine the value of different crosses and strains of cattle for foundation animals and commercial beef production. Location: Range Cattle Station, Ona.
- (b) To test the performance of different breeds and crosses in different breed systems and to determine if the combining ability of breeds used for cross breeding can be improved by cross progeny testing. Location: Brooksville. (co-operative with U. S. D. A.).
- (c) To describe and characterize the various types of dwarfism manifested in beef cattle of various breeds in Florida, to investigate the genetic relationship between the more prevalent types of dwarfism, and to determine the influence of genetic environment on expression of the snorter dwarf gene. Location: Gainesville.

II. Accomplishments During Year:

## (a) Facilities and cattle acquired:

1. Forty dwarf animals acquired for anatomical and breeding studies.
2. Forty-five acres of improved pasture established for dwarf and physiology of reproduction studies.
3. Twenty-five foundation animals added to Angus herd at Brooksville.

## (b) New work started:

Test matings of various types of dwarfs were made.

III. Future Plans:

- (a) Make additional test matings in dwarf herd.
- (b) Set up production records on I.B.M. cards.
- (c) Initiate analysis of records that have accrued.

IV. Publications During Year:

- (a) Koger, M., J. C. Dollahon, A. C. Warnick, W. G. Kirk, J. F. Hentges, Jr., and A. Z. Palmer. Forms of dwarfism in English and Brahman breeds of Beef Cattle. Journal of Animal Science 14:1186, 1955.
- (b) Carpenter, J. W., A. Z. Palmer, W. G. Kirk, F. M. Peacock and M. Koger. Slaughter and carcass differences between Brahman and Brahman - Short-horn crossbred Steers. Journal of Animal Science 14:1228, 1955.

# PERFORMANCE OF COW HERDS. 1955 CALVES

Page 14.

Florida Station

Line or group designation	Crossbreds	3/4Sh-1/4Br	3/4Br-1/4Sh	Brahman	Angus	Brahman	Brangus	Hereford	SG	SGxRR
Location	Shorthorn	Shorthorn	Brahman	Brahman	Angus	Brahman	Brangus	Hereford	SG	SGxRR
Breed of sire	Brahman	Shorthorn	Brahman	Brahman	Angus	Brahman	Brangus	Hereford	SG	SG
Breed of dam	Brahman	Shorthorn	Brahman	Brahman	Angus	Brahman	Brangus	Hereford	SG	SGxRR
No. cows bred(pasture bred)	16	21	19	14	14	27	44	34	20	21
No. cows calving	14	19	15	14	12	19	33	28	20	21
No. calves raised	13	18	15	14	12	19	29	27	18	21
Av. birth date	2-9-55	2-5-55	2-12-55	2-1-55	12-7-54	2-14	2-9-55	2-3-55	2-2	2-13-
Av. birth wt. (lbs.):										
Bulls	--	--	--	--	53.0	54.8	66.7	63.0	69.8	77.2
Heifers	--	--	--	--	48.5	56.7	56.7	56.8	62.4	72.4
Were calves creep fed?	No	No	No	No	No	No	No	No	No	No
Av. six months wt. (lbs.):										
Bulls	458	451	468	444	281.3	315.3	343.9	259.4	365.2	351.9
Steers	442	411	395	332	---	---	---	---	---	---
Heifers				324	259.3	291.5	305.6	244.6	368.2	342.3
Av. weaning date:	--	--	--	--	--	--	--	--	--	--
Av. weaning wt.:										
Bulls	524(8)	516(10)	525(7)	533(3)	308.3	331.3	357.0	290.6	399.0	380.8
Steers	504(5)	476(8)	463(8)	415(4)	---	---	---	---	---	---
Heifers				383(7)	325.0	302.1	317.9	259.3	393.1	347.8
Av. weaning type score:										
Bulls	--	--	--	10	8.5	8.6	8.7	9.3	8.3	7.6
Steers	10	12	10	9	--	--	--	--	--	--
Heifers	10	11	10	9	10.3	8.7	8.4	9.1	9.4	8.4
Av. weaning condition score:										
Bulls	--	--	--	10	7.0	7.7	7.6	6.5	7.8	7.3
Steers	11	11	11	9	--	--	--	--	--	--
Heifers	10	12	12	10	8.3	8.0	7.6	6.7	9.6	7.8

1/ Angus calves were not bred at this station, but were dropped here.  
2/ Number in parenthesis give number of calves.



POSTWEANING PERFORMANCE OF 1954 CALVES FULL FED AFTER WEANING  
(or pastured for high gains)

Florida Station

Line or group designation	2nd Cross	Crossbreds	2nd Cross	Brahman	Hereford	Brangus	Brahman	SG	RP
Location	3/4Sh-1/4Br	1/2Sh-1/2Br	3/4Br-1/4Sh	Brahman	Hereford	Brangus	Brahman	SG	RP
Breeding of calves									
Bulls, No.					3	3	2	5	2
Av. inbreeding (%)					--	--	--	--	--
Av. weaning wt.					297	412	446	504	276
Av. 12 month wt.					508.7	602.3	696.5	748.8	611.5
Len. feeding period					140	140	140	140	140
Feed per cwt. gain <sup>1/</sup>									
Av. da. gain on test					1.80	1.90	1.92	2.19	2.00
Steers, No.									
Av. weaning wt.	564	540	579	546					
Av. 12 month wt.	773	751	767	729					
Len. feeding period	140	140	140	140					
Feed per cwt. gain:									
Concentrates	616	624	614	584					
Roughage	145	149	147	148					
Av. daily gain on test	2.06	2.01	2.04	2.02					
Av. type score (12 mo.)	11	10	10	10					

<sup>1/</sup> Bulls were fed in lots with other bulls according to weight; therefore, the feed consumption per breed is impossible to furnish.

PRODUCTION AND/OR SLAUGHTER DATA ON YEARLING AND OLDER CATTLE  
NOT INCLUDED IN BREEDING HERDS IN 1955

Florida Station

Location	-----Brooksville-----				
Breeding:	Angus	Brahman	Brangus	Hereford	SG
Sex:	Female	Female	Female	Female	Female
No.	7 <sup>1</sup> / <sub>2</sub>	4	15	13	7 <sup>2</sup> / <sub>2</sub> / 10 <sup>3</sup> / <sub>3</sub> / 6 <sup>4</sup> / <sub>4</sub>
Av. age (fall 1954)	237	206	205	197	231
Av. wt. (fall 1954)	350	336	380	306	461
Av. winter gain	-3	41	24	19	20 <sup>2</sup> / <sub>2</sub> / -7 <sup>3</sup> / <sub>3</sub> / -24 <sup>4</sup> / <sub>4</sub>
Days on pasture	-----Run on pasture at all times.-----				
Av. gain on pasture(summer)	158	230	216	208	199 <sup>2</sup> / <sub>2</sub> / 225 <sup>3</sup> / <sub>3</sub> / 242 <sup>4</sup> / <sub>4</sub>
Av. wt. adjusted to 18 or 30 months of age	613	651	619	540	712 <sup>2</sup> / <sub>2</sub> / 658 <sup>3</sup> / <sub>3</sub> / 728 <sup>4</sup> / <sub>4</sub>

<sup>1</sup>/<sub>2</sub> Includes 6 weaning calves from Quincy

<sup>2</sup>/<sub>2</sub> Brooksville heifers

<sup>3</sup>/<sub>2</sub> Montgomery heifers

<sup>4</sup>/<sub>2</sub> Cooperative breeders' heifers

Heifers were fed one pound 41% cottonseed pellets from 9-15-54 to 1-7-55 on unfertilized Pensacola Bahia and Pangola pastures. From 1-7-55 to 4-30-55 they received three pounds Alyce Clover or Hairy Indigo hay in addition to the one pound pellets per day.



## GEORGIA STATION

- by -

B. L. Southwell

January 1, 1956

I. Project Title:

No. S-10 -- "Improvement of Beef Cattle for the Southern Region Through Breeding Methods." State No. A. H. 1. 1-2-3

"The Improvement of Beef Cattle in Georgia Through the Use of Selection for Economic Factors Brought Out in the Process of Inbreeding, Crossbreeding, and Outbreeding."

II. Objectives:

A. "Sire testing studies with Polled Hereford and Angus Cattle."

B. "The value of the Brahman breed in developing cattle that are better adapted to the climatic and feed conditions of the Coastal Plain area of the Southeast."

III. Accomplishments during the Year:

A. Five Polled Hereford bulls were used during the 1955 breeding period - April 8 to July 1. Two were used in sire testing studies and three were used in the three herds whose selection criteria are weaned weight, post-weaning feedlot gain and type or conformation, respectively. One bull was loaned the Station by Mrs. Ruby Turner of Nashville, Georgia. He was bred by Circle M. Ranch, Senatobia, Mississippi, and was used to head up the type herd in the Tifton studies.

Two Angus bulls were loaned to the Station by Sinkola Plantation, Thomasville, Georgia, for the 1955 breeding period. These together with one Station-bred bull were bred to approximately 15 cows each.

No new equipment was added during the year other than minor items for regular routine.

Two proved Polled Hereford bulls were placed in two other State breeding projects in 1955. One bull was loaned to Mississippi State College and one was sold to Virginia Agricultural Experiment Station for use in their cooperative breeding studies at Front Royal.

Two Angus calves were purchased in the spring of 1955, one from the testing program at Front Royal, Virginia, and one from the Wye Plantation in Maryland. The latter was fed in the Wye Plantation production testing program. These two bulls will be used in the 1956 breeding program.

B.(1) Polled Hereford Sire Testing Studies: Four bulls were proved during the fall and winter 1954-55 by feeding all their offspring in dry lot for 140 days. At the end of the test period each calf was rated according to the following formula:

$$\text{Rating} = \text{Type score} + \frac{\text{Av. daily gain}}{.05}$$

Each sire was given a rating equal to the average of all his offspring. Type score influenced the rating 50 per cent and rate of gain 50 per cent. The animals were scored by a committee on a form with values from 0 to 17 points. These type scores were converted to a numerical value of from 0 to 50 for their use in the formula. The four bulls tested received the following rating based on the performance of all his offspring:

No. F30, Bonny B. Domino 78	-	73.60
No. F27, Woodrow Mischief 70	-	77.21
No. 197, Victor Plato 37	-	70.50
No. 444, Coastal B Rollo 31	-	74.06

Sire No. 444 is a son of proved bull 497. Sires F30 and F27 were purchased from a Texas breeder (M. E. Fry & Sons, Cisco) and bull 197 was purchased from a South Carolina breeder (Neil Trask, Calhoun Falls). These three bulls were purchased in the fall of 1952 as weanling calves and fed in the 1952-53 program.

The highest daily gain made by any calf during the 1954-55 feeding period was 2.91 pounds. This calf likewise received the highest individual rating which was 92.91. Four Polled Hereford bull calves were treated for pneumonia during the feeding period, one was foundered and one buckled over in the rear legs rather badly but recovered.

All the bull calves were full-fed a grain mixture and were also full-fed Coastal Bermuda hay. The grain mixture was composed of:

6 parts ground snapped corn  
1 part cottonseed meal

The heifer calves were limited-fed grain (about three-fourths the amount they would have taken) and were full-fed hay.

Thirty-four bull calves and 33 heifer calves sired by six Polled Hereford bulls are being fed during the 1955-56 feeding period.

B.(2)Angus: Two Angus sires were proved in 1954-55. They are sons of the J. Garret Tolan bull, Eileenmere 500. The offspring from one of these two bulls were also fed during the 1953-54 period. The bull calves sired by No. 49 made average daily gains of 2.07 pounds while those from No. 92 made 1.84 pounds. There was the same relative difference in the gains of the heifer calves from the two bulls. A good percentage of the bull calves and two or three of the heifer calves had the tendency to "Knockle over" in the hind legs. Corrections for a possible Vitamin A deficiency in these calves failed to clear up the trouble. Offspring from the two Angus bulls gained slower than from any of the Hereford bulls. Their type scores however, on the average, were better than those of the Hereford offspring.

Offspring from two Angus bulls are being fed during the 1955-56 feeding period.

B.(3)Crossbreeding Studies: Nine heifer calves out of 1/2 Angus x 1/2 grade Hereford cows and heifers and 11 heifer calves out of 1/2 Brahman x 1/2 grade Hereford cows and heifers, both groups of calves being sired by the same Shorthorn bull, were fed during the 1954-55 feeding trials. The heifer calves out of the Brahman-cross cows were 74 pounds heavier



at weaning and two weeks later at the beginning of the feeding period than were the heifer calves out of the Angus-cross cows. However, the average daily gains of the two groups during the 140-day feeding period were exactly the same (1.96 pounds daily). The slaughter and carcass grades for both groups were also the same. The heifers out of the Brahman cows dressed 1.3 percent higher than those out of the Angus-cross cows, 60.16 percent as compared to 58.86 percent. Feed utilization of the calves out of the Angus cows was slightly better than that by the calves out of the Brahman-cross cows.

#### IV. Future Plans:

Two herds of approximately 18 cows each will be used in the Polled Hereford sire testing program in 1956. In addition the weaned weight herd, the post-weaning feed lot gain herd, and the type herd will be continued. The offspring from the latter three herds will be fed first as the offspring from the test herds. It is hoped enough females will be available in 1957 to set up three test herds and maintain that number for several years.

The Angus herd will be maintained as a two-sire herd.

Crossbreeding studies at Tifton have been discontinued as of March, 1955.

The crossbreeding (cooperative) study at the Georgia State Prison Farm is progressing satisfactorily. It is hoped enough data will have been accumulated to make a report in the next year or two.

#### V. Publications During the Year:

"A Summarization of Brahman Crossbreeding Studies" by W. C. McCormick was presented at the S-10 meeting in 1955.

Annual Reports to the Georgia Coastal Plain Experiment Station, to the Regional Director of the Southern Beef Cattle Breeding Project and the Animal and Poultry Husbandry Research Branch, ARS, U.S.D.A.

#### VI. Publications Planned:

McCormick, W. C., B. L. Southwell and E. J. Warwick. Factors Affecting Performance in Herds of Purebred and Grade Hereford Cattle.



POSTWEANING PERFORMANCE OF 1954 CALVES FULL FED AFTER WEANING  
(or pastured for high gains)

Georgia Station

Location	Tifton							
Breeding of calves	P.H.	P.H.	P.H.	P.H.	Ang.	Ang.	S.H.x Ang.x Here.	S.H.x Brah. x Her.
<u>Bulls, No.</u> <sup>1/</sup>	11	6	10	8	7	9		
Av. weaning wt.	410	428	412	448	460	447		
Av. 12 month wt. (days of age)	727 (371)	785 (369)	735 (343)	776 (361)	724 (361)	755 (359)		
Len. of feeding period	140	140	140	140	140	140		
Feed per cwt. gain	688.1	662.8	725.9	727.5	937.0	888.0		
Concentrates	615.7	602.3	644.3	641.8	810.2	805.9		
Roughage	69.4	60.5	81.5	85.7	126.7	82.1		
Av. da. gain on test	2.21	2.53	2.18	2.35	1.84	2.02		
Av. type score (12 mo)	11.5	10.9	11.0	11.4	11.8	12.3		
	Sire: F30, 7171713 Bonny B. Domino 78	Sire: F27, 7171710 Woodrow Mischief 70	Sire: 197, P-7314478 Victor Plato 37	Sire: 444, P-7279927 Coastal B Rollo 31	Sire: 92, 1461688 Eileenmere 1136	Sire: 49, 1559843 Eileenmere 1147	Sire: Shorthorn Dam: $\frac{1}{2}$ Ang. x $\frac{1}{2}$ Gr. Hereford	Sire: Shorthorn Dam: $\frac{1}{2}$ Br. x $\frac{1}{2}$ Gr. Hereford
<u>Heifers, No.</u> <sup>1/</sup>	4	7	3	8	9	4	9	11
Av. weaning wt.	410	373	377	366	429	471	361	425
Av. 12 month wt. (days of age)	640 (374)	648 (369)	611 (346)	584 (356)	634 (368)	700 (364)	655 (364)	729 (362)
Len. of feeding period	140	140	140	140	140	140	140	140
Feed per cwt. gain							827	861
Concentrates							686	740
Roughage							141	121
Av. da. gain on test	1.77	1.91	1.61	1.61	1.44	1.54	1.96	1.96
Av. type score (12 mo)	11.5	11.4	11.1	11.2	12.6	12.0	12.5	11.1

<sup>1/</sup> Calves on 13-day preliminary feeding period and weaning and prior to 140-day test period.

## PERFORMANCE OF COW HERDS. 1955 CALVES

Georgia Station

Line or group designation	Polled Hereford	Angus
Location	Tifton	Tifton
Breed of sire	Polled Hereford	Angus
Breed of dam	Polled Hereford	Angus
No. cows bred	108	45
No. cows calving	75	33
No. calves raised	67	28
Av. birth date	2/22/55	2/13/55
Av. birth wt. (lbs.):	71.07	64.67
Bulls	75.20	67.31
Heifers	66.09	64.12
Were calves creep fed?	Yes	Yes
Av. wt. at six months (lbs.):	360.90	408.11
Bulls	381.20	446.46
Heifers	340.09	374.86
Av. weaning date: (Both sexes)	9/21/55	9/21/55
Av. weaning weight:	409.18	464.64
Bulls	431.91	508.85
Heifers	385.76	426.33
Av. weaning type score:	11.43	12.50
Bulls	11.96	12.10
Heifers	10.88	12.90
Av. weaning condition score:	10.00	11.60
Bulls	10.00	10.90
Heifers	10.10	12.30

PRODUCTION AND/OR SLAUGHTER DATA ON YEARLING AND OLDER CATTLE  
NOT INCLUDED IN BREEDING HERDS IN 1955

Georgia Station

Line or group designation Breed of sire Breed of dam	Crossbreeding Shorthorn $\frac{1}{2}$ Ang x $\frac{1}{2}$ Gr. Her	Crossbreeding Shorthorn $\frac{1}{2}$ Brah x $\frac{1}{2}$ Gr Her
Sex	Female	Female
No.	9	11
Av. age (fall 1954)	224 days	222 days
Av. wt. (fall 1954)	381.5	455.7
Av. winter gain	273.8	273.7
Days on feed <sup>1/</sup>	140	140
Av. gain on feed	273.8	273.7
Animals Slaughtered:	9	11
Av. age at slaughter	364 days	362 days
Av. slaughter weight	655.4	729.4
Av. slaughter grade	Ch-	Ch-
Av. dressing percent	58.86	60.16
Av. carcass grade	Ch-	Ch-

<sup>1/</sup> Full-fed in dry lot 140 days:

Grain Mixture -

6 parts ground snapped corn  
1 part cottonseed meal

Hay -

Coastal Bermuda



## KENTUCKY STATION

- by -

R. A. Long and D. G. Steele  
January 1, 1956

I. Project Title:

A Performance and Progeny Testing Program for Bulls of the Beef Breeds

II. Objectives:

To use weaning weights, rate of gain, efficiency of gain, conformation, and condition of bull calves in an effort to determine what weight these items should receive in predicting the value of bulls in the breeding herd.

III. Accomplishments:

- (1) A 154 day performance test was completed on 15 bulls (7 Herefords, 6 Angus and 2 Shorthorns) the data from which is presented in Table I. Fifteen more bulls (5 Herefords, 7 Angus, and 3 Shorthorns) have already been started on an identical test.
- (2) The breeding dates on all brood cows in the University herd have been changed from a year around program to a 2½ months breeding season for early spring calves so that comparisons within breeds and between breeds can be made.
- (3) Four bulls from the first performance test (two high gaining and two low gaining bulls) are being compared as to gain on pasture. At the end of this grazing period a 10 day preliminary and 10 day fecal collection period will be run using chromic oxide as an indicator in order to compare the digestibility of protein, fat and fiber.

IV. Design of Performance Test:

Purebred beef bulls are used in the test and may be nominated by any Kentucky breeder. A fee of \$125.00 per head provides feed, care and veterinary expenses for a six-months period. The bulls are allowed a two or three weeks period to become accustomed to their surroundings and the ration fed. Detailed records are kept on feed consumed and rate of gain for a period of 150 days. The bulls are individually self-fed a pelleted ration of the following formula:

Ground shelled corn. . . . .	.23.2%
Ground oats. . . . .	.23.2%
Wheat bran . . . . .	5.8%
Linseed oil meal . . . . .	5.8%
Blackstrap molasses. . . . .	7.2%
Alfalfa meal . . . . .	.11.6%
Ground Timothy hay . . . . .	.23.2%

In addition the bulls have access to loose salt, ground limestone, steamed bone-meal, and fresh water. At the beginning and the end of each test the bulls are rated by a committee as to conformation and degree of finish. Photos are also taken behind a six inch grid so that body measurements may be compared with various other data. At the end of the test the bulls are returned to their owners for sale or for use in the breeding herd.

V. Future Plans:

- (1) Two 154-day performance tests will be conducted each year.

- (2) Four bulls from the first performance test (bulls 8, 9, 10 and 11 in Table I) will each be mated with 25 grade Hereford cows during the summer of 1956 and the calves from these matings compared after weaning as to feed lot performance and carcass value. These cows will be lotted as uniformly as possible as to age, conformation and previous weaning weights of their calves.

TABLE I

Breed and Identification No.	Initial Wt., lb.	Final Wt., lb.	Av. Da. Gain lb.	Feed/cwt. Gain, lb.	Age at End of Test, days	Weight* for Age	Average Score** Conformation	Average Score** Condition	Breeder
Angus -- 2	638	1017	2.46	733	396	2.57	1 -	Low Prime	C. V. Whitney
Angus -- 3	627	967	2.21	771	403	2.15	2	Low Ch.	"
Angus -- 4	525	865	2.21	616	367	2.36	2 -	High Good	"
Angus -- 5	642	1025	2.49	866	396	2.59	2	Low Ch.	"
Angus -- 6	667	993	2.12	722	396	2.51	2	Av. Ch.	"
Angus -- 7	548	830	1.83	744	372	2.23	3	High Comm.	"
Hereford - 8	653	1037	2.92	643	505	2.05	1 -	High Ch.	C. B. McCord
Hereford - 9	698	1062	2.36	787	506	2.10	2 +	Av. Ch.	Winchester
Hereford - 10	760	1207	2.90	771	507	2.38	1 -	High Ch.	"
Hereford - 11	637	990	2.29	737	493	2.00	2 -	Av. Good	J. D. Gay, Jr.
Shorthorn- 12	640	1052	2.68	758	464	2.26	2 -	High Good	Pine Grove
Shorthorn- 13	555	1000	2.89	671	414	2.41	2 -	High Good	James Kirk
Hereford - 14	625	1103	3.10	637	445	2.48	2	Av. Ch.	Maysville
Hereford - 15	758	1230	3.06	819	444	2.77	2	Av. Ch.	"
Hereford - 16	530	977	2.90	607	441	2.21	2 -	Av. Good	Laban Jackson
Averages			2.56	725		2.34			Shelbyville

\* Final weight divided by days of age.

\*\* Scored from 1 + to 3 - with 1 + as the most desirable as to conformation.

\*\*\* This grade ignores conformation and indicates a degree of finish carried by a typical slaughter steer of the same grade.



## LOUISIANA STATION

- by -

R. A. Damon, Jr.

January 1, 1956

I. Project Title:

The Improvement of Beef Cattle for the Southern Region Through Breeding Methods.

II. Objectives:

- (a) To develop types of beef cattle best suited to conditions along the Gulf Coast.
- (b) To compare the performance of several breeds of beef cattle and crosses between these breeds with respect to rate of growth on pasture, fattening ability, and meat quality of steers.
- (c) To estimate the amount of hybrid vigor that can be expected to result from crossing beef breeds and to ascertain the methods best suited for its utilization and maintenance.

III. Accomplishments during the Year:

- (a) One hundred and twenty-four calves were raised in the crossbreeding project during the past year, making a total of 344 calves for the three years which the experiment has been conducted. Some of the data which have been gathered on the last year's calf crop are presented in the accompanying tables. Weaning weights have been adjusted to 180 days but no adjustments have been made for ages of the dams. The data have been grouped by breed of dam and by breed of sire. Since there are so many different crosses, it would make the tables too voluminous to present the results in such detail, although they are, of course, a vital part of the study.

When the weaning weights are examined by the breed of dam, the Brangus cows again are shown to have weaned the heaviest calves. The Brahman cows did not show the superiority over the British breeds they did the previous year, although a separate analysis does show that for a three year period the calves out of Brahman cows have an average weaning weight considerably heavier than the calves out of Angus and Hereford dams.

Grouping the weaning weights by breed of sire shows that, for the third year in a row, the Charolaise bull sired the calves that were heaviest at weaning. Also, for the third year, the Angus bull sired the lightest calves. The results have been quite consistent in the three year period when the weaning weights have been grouped by sires, as a three year average shows exactly the same ranking as this year's results.

- (b) Two groups of heifers produced in the project now have an 18 months weight record. When grouped by breed of dam, the heifers out of Brahman cows have shown a decided weight advantage over the other three groups, with the heifers out of Brangus cows being slightly heavier than those out of Hereford and Angus cows. This was very marked for both the heifers born in

1953 and those born in 1954. When the weights are grouped by breed of sire, there is very little change from the ranking at weaning. The heifers sired by Brahman bulls do not demonstrate the weight advantage shown by heifers out of Brahman cows, and rank fifth out of the six groups.

- (c) Forty-nine steers produced in the project in the spring of 1954 were fed on a wheat pasture with a concentrate supplement composed of 6 parts corn and 1 part cottonseed meal. The steers were fed an average of  $6\frac{1}{2}$  lbs. of concentrate daily and made an average gain of 1.72 lbs. per day. The animals were slaughtered in the meats laboratory of the University at the end of a 168-day feeding period. A great many measurements and determinations were made on the carcasses which could not be included in this report. However, many pertinent data are presented in the accompanying table.
- (d) The steers produced in the spring of 1955 have recently been placed on a wheat and rye grass pasture which will be supplemented by a concentrate supplement. They will be fed out for 168 days and then slaughtered in the University's meats laboratory.
- (e) The breeding plans as shown in the 1952 and 1953 Annual Reports of S-10 were carried out in the spring of 1955, the breeding season extending from April 1, 1955 to June 30, 1955. A different bull was used to represent each of the breeds and the cow herds were rotated to bulls of different breeds.
- (f) Work is continuing in the study of the inheritance and effect of muscular hypertrophy or "double-muscling" in cattle. Several steers have been slaughtered and detailed carcass studies have been made. Additional steers are being fed out in order to build up a large body of data which apparently will be necessary in the study of this anomaly. Heifers produced in this project are being retained for enlarging the scope of this work.
- (g) Approximately 35 head of cattle have been accumulated for the dwarfism study being initiated at this station. Various matings are being made in order to shed light on the confusing picture of the inheritance of the various types of dwarfism.

#### IV. Future Plans:

The breeding plans as outlined in previous reports will be followed in the coming year. Due to small size of calf crops, however, it will be necessary to continue with the first phase of the project for an additional year.

The studies of dwarfism and muscular hypertrophy will be continued and expanded as much as possible. Approximately 200 acres of land plus a barn and other facilities have been made available for the dwarfism work which facilitate this project considerably.

#### V. Publications:

Results of the crossbreeding work were presented at the Annual Conference of College of Agriculture, Louisiana State University, Baton Rouge, Louisiana, December 6, 1955.

Annual Report 1953-54. Louisiana State Experiment Station. Improvement of Beef Cattle for the Southern Region. R. A. Damon, Jr., C. B. Singletary, P. B. Brown, S. E. McCrairie, T. M. DeRouen, R. M. Crown, and J. B. Francioni, Jr.



## POSTWEANING PERFORMANCE OF 1954 STEER CALVES

Fed on Pasture and Concentrate Supplement

Baton Rouge, Louisiana Station

	Angus Crossbreds	Brahman Crossbreds	Grangus Crossbreds	Charolaise Crossbreds	Hereford Crossbreds	Shorthorn Crossbreds
No. Steers	10	11	6	3	9	10
Feeder Grade <sup>1/</sup>	13.33	13.23	12.08	14.58	13.89	14.35
Slaughter Calf Grade <sup>2/</sup>	13.44	12.59	11.38	14.33	13.33	13.85
Slaughter Grade <sup>3/</sup>	6.52	7.09	9.12	6.33	6.78	6.02
Av. Daily Gain <sup>5/</sup> on Feed	1.72	1.63	1.43	1.88	1.83	1.86
Carcass <sup>4/</sup> Grade	16.60	19.34	19.60	17.07	16.97	15.20
Hot Dressing Percentage	58.33	59.36	59.80	60.65	58.49	59.43
Chilled Dressing Percentage	57.66	58.76	59.12	59.85	57.83	58.79
Planimeter Area Eye of Lean	9.68	8.89	8.75	10.36	9.68	9.04
Shearing Strength Tenderness	9.18	12.82	12.13	12.52	11.94	7.25

<sup>1/</sup> Common 3-5, Medium 6-8, Good 9-11, Choice 12-14, Fancy 15-17<sup>2/</sup> Utility 3-5, Commercial 6-8, Good 9-11, Choice 12-14, Prime 15-17<sup>3/</sup> Prime 1-3, Choice 4-6, Good 7-9, Commercial 10-12, Utility 13-15<sup>4/</sup> Prime 1-12, Choice 14-18, Good 20, Commercial 22-24, Utility 26-30<sup>5/</sup> Length of period 168 days

## PERFORMANCE OF COW HERDS. 1955 CALVES

Louisiana Station

Location	- - - - - Baton Rouge - - - - -			
	Brangus 48	Angus 48	Hereford 48	Brahman 48
Breed of Dam				
No. of cows bred				
No. cows calving	35	36	28	34
No. calves raised	34	31	27	32
Av. birth date	2-27-55	2-24-55	3-6-55	3-9-55
Av. birth wt. (lbs.):	74.5	69.0	79.4	63.7
Bulls	78.5	73.3	86.0	66.2
Heifers	71.7	63.8	72.2	62.2
Were calves creep fed?	No	No	No	No
Av. wt. at six months (lbs.):	437.4	382.0	396.7	396.3
Steers	463.4	401.1	425.1	419.4
Heifers	419.2	358.8	366.1	382.4
Av. weaning date: (Both Sexes)	11-3-55	11-3-55	11-3-55	11-3-55
Av. weaning wt.:	505.3	432.6	438.0	462.0
Steers	541.4	456.2	472.5	493.3
Heifers	480.0	403.9	400.8	443.2
Av. weaning type score:				
Heifers	Choice	L.Ch.	H.Good	L.Ch.
Av. weaning condition score:				
Steers	H.Good	Good	Good	Good
Heifers	Good	L.Good	L.Good	Good
Heifers	H.Good	H.Good	Good	H.Good



## PERFORMANCE OF COW HERDS. 1955 CALVES

Louisiana Station

	----- Baton Rouge -----					
Breed of sire No. cows bred	Angus 32	Brahman 32	Brangus 32	Charolaise 32	Hereford 32	Shorthorn 32
No. cows calving	16	23	26	22	26	20
No. calves raised	15	19	25	19	26	20
Av. birth date	3-18-55	3-1-55	2-27-55	2-20-55	3-7-55	2-27-55
Av. birth wt. (lbs.):	68.5	73.5	71.2	75.2	71.0	68.7
Bulls	68.2	82.0	71.7	83.2	74.6	75.2
Heifers	68.6	65.9	70.7	66.3	68.0	63.4
Were calves creep fed?	No	No	No	No	No	No
Av. wt. at six mos. (lbs.)	393.8	397.6	395.8	433.1	405.4	399.0
Steers	401.4	435.0	413.3	441.1	422.3	436.6
Heifers	390.0	363.9	379.7	424.1	390.9	368.2
Av. weaning date:	All calves weaned on 11-3-55 -----					
Av. weaning wt.:	442.3	468.9	463.8	500.8	436.9	459.2
Steers	471.0	510.6	495.0	501.5	452.1	504.4
Heifers	428.0	431.5	435.0	500.0	423.9	422.3
Av. weaning type score:						
Heifers	L.Ch.	L.Ch.	H.Good	L.Ch.	L.Ch.	L.Ch.
Av. weaning condition						
score:	H.Good	H.Good	Good	Good	Good	H.Good
Steers	Good	H.Good	Good	L.Good	Good	Good
Heifers	H.Good	H.Good	Good	Good	H.Good	H.Good

JEANERETTE STATION

- by -

E. H. Vernon

January 1, 1956

I. Project Title:

The Improvement of Beef Cattle in the Southern Region Through Breeding Methods.

II. Objectives:

- (a) To gather data designed to yield a partial evaluation of the strains of Brahman-Angus and Africander-Angus crossbred cattle at the Jeanerette Station.
- (b) To provide for the progeny and development of these strains of cattle.

III. Accomplishments during the Year:

- (a) Breeding - The breeding program described in previous annual reports was followed closely during the past year. The six Brahman-Angus herds and four Africander-Angus herds were continued as closed herds. There were 121 Brahman-Angus breeding cows and 54 Africander-Angus breeding cows. The purebred Brahman herd, consisting of 37 breeding cows, was divided into two sub-herds; superior bulls were retained from each line for future use. There has been a minimum culling of heifers, and, as the size of the herd is being expanded, culling of adult cows is also minimum. Twenty-nine purebred Aberdeen-Angus heifers have been added to the farm herd and should be ready in another year to be used with the purebred Brahman to set up a breeding program consisting at first of two herds, each containing an equal number of purebred Brahman and purebred Aberdeen-Angus cows - one to be headed by a purebred Brahman and the other by a purebred Aberdeen-Angus bull. This program will be expanded as increases in numbers permit to include four of the mixed herds instead of two.
- (b) Feeding - Thirty bull calves, selected on the basis of 180-day weight and beef type, were placed on 154-day Record of Performance test October 6, 1954. The remaining 43 bull calves were castrated and placed on Record of Performance test at the same time. One steer died during the test, leaving a total of 42. Record of Performance feeding tests were completed March 9, 1955. The average daily gain of all bulls regardless of breeding was 2.33, of all steers 1.70 pounds. The average daily gains, according to breeding were:

Breeding	Sex	Av. Daily Gain
Brahman	Bull	2.18
Brahman	Steer	1.58
Africander-Angus	Bull	2.18
Africander-Angus	Steer	1.66
Brahman-Angus	Bull	2.41
Brahman-Angus	Steer	1.77



The 1955 calf crop consisted of 52 heifer calves and 56 bull calves which reached weaning age. Twenty of the bull calves were selected for Record of Performance feeding test as bulls and placed on test October 21, 1955. The remaining male calves were castrated and also placed on Record of Performance test. One of the steers died on November 26, 1955, reducing the number from 34 to 33.

- (c) Heat Tolerance - Analyses of heat tolerance data taken at the Iberia Livestock Experiment Farm during the years 1943-53 were continued during the past year. To date the analyses show no significant correlation between heat tolerance as measured by the Iberia coefficient of heat tolerance and performance, as measured by birth, six-month and five-year weights of cows and progeny.

Correlations between respiration rates and rectal temperatures were highly significant in all groups except mature Brahman cows for which data were available from five cows only. Correlations for crossbred animals ranged from approximately .45 to .60, and are not considered sufficiently high to substitute the respiration rates for rectal temperatures as a measure of heat tolerance.

#### IV. Future Plans:

Present plans will be continued in the future. The only change in plans which have already been formulated, some of which as yet have not been put into practice but will be soon, is to feed part or all steers on a combined grazing and concentrate basis to be marketed at approximately 18 months of age.

#### V. Publications:

None of the Jeanerette data was used in formal publication in 1955. A talk given by E. H. Vernon at the Annual Meetings of the Southern Section of the American Range Management Society consisted of a rather informal but fairly conclusive summary of the history and accomplishments at the Iberia Station since 1943.

It is hoped that when the analyses of heat tolerance data are completed that the material may be worthy of publication.

#### PRODUCTION AND/OR SLAUGHTER DATA ON YEARLING AND OLDER CATTLE NOT INCLUDED IN BREEDING HERDS IN 1955

Louisiana Station.

Animals slaughtered:	Brahman x Angus	Africander x Angus	Brahman
Number	20	17 <sup>1</sup> / <sub>2</sub>	5
Av. age at slaughter (days)	393	402	390
Av. live slaughter weight	742	697(15)	637
Av. carcass weight	423	396	362
Av. slaughter grade	9.7	9.1	7.7
Av. dressing percent	57.0	56.3	56.8
Av. carcass grade	L.G.++	L.G.+	L.G.

<sup>1</sup>/<sub>2</sub> Eighteen started test -- 17 finished; 2 slaughtered at LSU -- no slaughter data; 15 slaughtered Swift and Company -- slaughter data available.

## PERFORMANCE OF COW HERDS. 1955 CALVES

Louisiana Station

Line or group designation Location Breed of sire and dam Number cows bred	Brahman x Angus - - - - Iberia Livestock Farm, Jeanerette Brahman x Angus 108	Africander x Angus - - - - Africander x Angus 45	Brahman - - - - Brahman 12
Number cows calving	79	28	11
Number calves raised	71	27	8
Av. inbr. of dams (%)	3.48	5.55	--
Av. inbr. of calves (%)	7.69	11.97	--
Av. birth date	2-2-55	1-31-55	2-5-55
Av. birth wt. (lbs.):			
Bulls	70.6	63.3	60.8
Heifers	64.2	66.1	51.6
Were calves creep fed?	No	No	No
Av. wt. at six months (lbs.):			
Bulls	430.8	380.5	334.0
Heifers	386.7	363.5	341.5
Av. weaning date	- - - - - Both sexes weaned 9-21-55 - - - - -		
Av. weaning weight:			
Bulls	492.2	434.2	382.5
Heifers	447.2	423.0	390.0
Av. weaning type score:			
Bulls <sup>1/</sup>	10.8	9.2	9.6
Steers <sup>-</sup>	8.4	6.9	7.2
Heifers	10.1	9.5	9.6
Av. weaning condition score:			
Bulls <sup>1/</sup>	10.1	7.6	9.3
Steers <sup>-</sup>	7.7	6.2	6.3
Heifers	8.7	8.2	8.8

<sup>1/</sup>  
Castrated after weaning.



POSTWEANING PERFORMANCE OF 1954 CALVES FULL FED AFTER WEANING  
(or pastured for high gains)

Louisiana Station

Line or group designation Location Breeding of calves Av. inbreeding (%)	Brahman x Angus - - - - Iberia Brahman x Angus 5.09	Africander x Angus Livestock Farm, Jeanerette Africander x Angus 10.29	Brahman - - - Brahman --
<u>Bulls</u> , No.	19	7	4
Av. inbreeding (%)	4.71	9.8	--
Av. weaning wt.	586.8	497.1	488.8
Av. 12 month wt. <sup>1/</sup>	925.5	820.7	780.0
Len. of feeding period	154	154	154
Feed per cwt. gain (lbs.) <sup>2/</sup>			
Av. daily gain on test	2.41	2.18	2.18
Av. type score <sup>1/</sup>	10.5	12.0	11.4
<u>Steers</u> , No.	20	17	5
Av. inbreeding (%)	4.35	12.8(18)	--
Av. weaning wt.	489.2	457.5(18)	422.0
Av. 12 month wt. <sup>1/</sup>	741.2	697.1	637.0
Len. of feeding period	154	154	154
Feed per cwt. gain (lbs.)	This information not available for steers		
Av. daily gain on test	1.75	1.66	1.59
Av. type score <sup>1/</sup>	9.7	9.0	9.7

<sup>1/</sup>End R.O.P. test 3-9-55

<sup>2/</sup>Method of feeding does not allow for breaking down by group. All bulls, on the average, consumed 848.8 pounds of mixed allyce clover hay, corn, cottonseed meal, and molasses at the rate of 7, 3, 2, 2 for the first 28 days and in the proportions 7, 7, 4, 3 by weight (all periods) for the rest of the test.

MARYLAND STATION

- by -

J. E. Foster

January 1, 1956

I. Project Title:

C-14 A Study of Productiveness of Purebred Beef Cattle in Maryland

II. Objectives:

- (a) To study productiveness of existing or introduced stocks of beef cattle. Productive characteristics measured will include rate of gain, economy of gain, market type, carcass quality, fertility, longevity, adaptation to environmental conditions, and other factors affecting the utility value of beef cattle.
- (b) To compare selective criteria (individual and pedigree) with actual performance of progeny.
- (c) To evaluate breeding techniques for small purebred herds under the varying conditions encountered in practice in purebred herds.
- (d) To attempt to produce beef cattle with superior productive capacities by line breeding and selection. (Using criteria of selection as developed in this project and by cooperating stations in this and other regions.)

III. Accomplishments During the Year:

Weights and linear measurements as requested by the S-10 Committee have been secured on the Aberdeen-Angus and Hereford herds owned by the University of Maryland on the same basis as previously reported. Cooperation with the owner of the Aberdeen-Angus herd which had been in effect since 1949 was discontinued last spring because the herd was dispersed. Dispersal occurred before the usual spring weights were secured.

Cooperative work involving the weighing (and scoring, see Project C-14-b) of two sets of Aberdeen Angus calves in a rate of gain study conducted under farm conditions was initiated in the fall of 1954 by the addition of a new cooperator to the project. Set I (27 calves) was weaned, weighed and started on trial October 31, 1954, weighed on January 28, 1955, and weighed off trial on March 31, 1954. Set II (18 calves) was weaned prior to the start of the second trial which was initiated January 28, 1955, and ended June 8, 1955; one intervening weight being taken on March 31, 1955. Calculations of the data have been completed. Age and weight were significantly correlated in Set I but not in Set II. Gains were not significantly correlated with age or weight except for one instance in the Set II calves. Further work has been started as 32 bull calves were weaned, weighed, and placed on trial October 28, 1955, and weighed again November 22, 1955. Weights, ages, and other pertinent data are being secured for the 1955-56 study.

IV. Future Plans:

Routine weights and linear measurements will be taken of animals of the Aberdeen-Angus and Hereford herds owned by the University of Maryland. Cooperative work will be continued with the new cooperator and the data from this



year's feeding trials will be analyzed as rapidly as possible. Fourteen additional bull calves are scheduled to be placed on trial in January, 1956. Cooperators will be added if contributions to project are foreseen.

V. Publications During the Year:

Brown, C. J., E. J. Warwick, H. J. Smith, W. W. Green, and H. A. Stewart.  
Relationships between type scores and live animal measurement of beef cattle. Manuscript prepared and submitted for publication.

VI. Publications Planned:

See Project C-14-b.

- - - - -

I. Sub-Project:

C-14-a Effects of Early Weaning on the Duration of Maternal Influences in Beef Calves.

II. Objectives:

- (a) To attempt to develop a new technic for an earlier evaluation of feed lot performance, progeny testing, and genetic evaluation of beef animals.
- (b) To develop sound feeding and management practices for beef calves weaned at an early age.
- (c) To evaluate the calves' genetic ability to thrive under new systems of care.

III. Accomplishments During the Year:

The 31 calves representing three sire groups put on individual feeding the summer of 1954 completed their feeding trials. Individual feed and weight records as well as a series of linear measurements were taken as in the previous year. No 1955 calves were placed on feeding trial under this project. All basic calculations such as sums and sums of squares, etc., have been completed on all data collected since 1949. Further work has been completed on the study of partitioning the T.D.N. intake into that used for (a) growth and (b) non-growth purposes. The latter includes requirements for maintenance, digestion of food, activities, etc. Maintenance requirements are usually given as essentially equal to the 0.66 to 0.73 power of body weight. The T.D.N. required for non-growth activities was found in this study to differ between the sexes within year and sire progeny groups of the calves weaned at 90 days of age. For the steers, the relationship was weight raised to about the 0.6 power from 90-174 days of age and around 1.0 after 174 days. The power of weight decreased for the females from near 1.0 from 90 to 118 days to about 0.5 at 230 to 258 days and then went up to about 0.8-0.9.

IV. Future Plans:

Emphasis will be placed on study of the accumulated data. No additional calves will be fed under this project unless analyses of the data indicate more work is necessary.

V. Publications During the Year: None

VI. Publications Planned:

Publications will be prepared as rapidly as studies on the data permit.

- - - - -

I. Sub-Project:

C-114-b Type Classification as an Aid in Selection of Beef Breeding Cattle.

II. Objective:

To determine the value of type classification in beef cattle, i.e., heritability of beef type and production.

III. Accomplishments During the Year:

The Aberdeen-Angus and Hereford herds of the University of Maryland were classified twice during the year. One co-operator was lost from the project as his herd was dispersed. One new cooperator was added to the project. Two sets of Aberdeen-Angus bull calves were placed on rate of gain trials (see Project C-114) and scores were taken on the calves at the start and end of the trials. Three scorers were used. Correlations between scores made by different judges on the same part of the body at the same time ranged from 0.21 to 0.84 with most of the correlations being in the neighborhood of 0.4 to 0.6, indicating a relatively low degree of predictability of score from one scorer to another. Correlations between scores made by the same person, on the same part of the calves' bodies, but at a time interval of about five months were, in general, low -- a few being 0.7 and above. Correlations between scores and age and weight on the day of scoring were rather low and indicated day-to-day shifts in scoring standards. Correlations between scores and gain while on feed were low ranging from about zero to 0.6.

A new scoring sheet has been designed and put into use. Fifty-five items are included on the score sheet, many of them pertaining to the same parts as measured on the C-114-a Calves and C-114-d Calves. The main advances of the new score sheet over the old are (a) fewer parts of the body are included in any one item and (b) the scale of points goes from 50 to 130, 100 being the most desirable, so the score will show not only that an animal is not "ideal" but the direction of variation from the "ideal." Calves fed under projects C-114 and C-114-d have been scored.

IV. Future Plans:

The Aberdeen-Angus and Hereford herds of the University of Maryland will be scored semi-annually as in the past. Scores have been and will be taken on the calves of the cooperator's herd (Project C-114) and on those calves in Sub-Project C-114-d. The new score sheet will be used.

V. Publications During the Year: See Project C-114

VI. Publications Planned:

A publication is planned which will cover the work done on the cooperator's bull calves and which will also include work done under Project C-114.



I. Sub-Project:

C-14-d Group Versus Individual Feeding of Weaned Beef Calves.

II. Objectives:

- (a) To evaluate the accuracy of group versus individually fed calves as a technique in the testing of sire-progeny groups.
- (b) To study the possibility of forecasting the productiveness of beef calves by using single or combined measurements taken on live animals.
- (c) To study the value of scores taken on live animals in relation to forecasting their performance.
- (d) To compare measurements and scores in order to search for objective methods of determining scores.
- (e) To study absolute and relative changes in measurements and scores from one age to another.

III. Accomplishments During the Year:

Nineteen Angus calves and 22 Hereford calves were weaned on October 11, 1955, and started on feed at the P. M. feeding. Allotment of calves into feeding and management regimen (group versus individual) was made at random by breed and sex. Individual and group feed records are being kept on a 28 day period basis. Weights have been taken at weaning time, weekly for the first 28 days, and at 28-day intervals thereafter. Calves are fed twice daily (A.M. - P.M.) in such amounts of grain, hay and silage as they will clean up. Hay is being fed unchopped. Measurements and scores were made on all calves as in C-14-a and C-14-B. All calves were creep fed up to weaning time.

IV. Future Plans:

The feeding trial now under way along with measurements and scores, will be continued on the 1955 calf crop. The 1956 calves will be managed and placed on feeding trial in a manner similar to the 1955 calves.

V. Publications During the Year: None

VI. Publications Planned: None

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 PRODUCTION AND/OR SLAUGHTER DATA ON YEARLING AND OLDER CATTLE  
 NOT INCLUDED IN BREEDING HERDS IN 1955

Line or group designation	University of Maryland	
	Angus	Hereford
Breeding	Heifers to be added to herd	
Sex		
No.	7	5
Av. age (fall 1954) (months)	19.5	19.5
Av. wt. (fall 1954)	809	845
Av. winter gain	153	211
Days on pasture	173	173
Av. gain on pasture	84	154

Above heifers were selected to go back into breeding herd and were fed for development rather than finish. From October 5, 1954 to May 2, 1955 wintered on approximately full feed of roughage (silage and hay) and six pounds of concentrate per head daily. Grazed on rather poor pasture from May 2 to October 10.

POSTWEANING PERFORMANCE OF 1954 CALVES FULL FED AFTER WEANING  
(or pastured for high gains)

Maryland Station

Location	University of Maryland		
	Aberdeen Angus		Hereford
	Outbred Herd		Outbred Herd
Breeding of calves			
Av. inbreeding (%)			
	<u>Individually Fed</u>	<u>Group Fed</u>	<u>Group Fed</u>
<u>Steers, No.</u>	5	None	10
Av. inbreeding (%)	Outbred Herd		Outbred
Av. weaning wt.	381 <sup>1/</sup>		405(231 da)
Av. 12 month wt.	722		674(380 da)
Length of feeding period	190 <sup>2/</sup>		269
Feed per cwt. gain (lbs.)	839 <sup>3/</sup>		979
Concentrates	559		656
Roughage	280		323
Av. daily gain on test	1.80		1.78
Av. type score (12 months)	10		10
<u>Heifers, No.</u>	6	5	9
Av. inbreeding (%)	Outbred	Outbred	Outbred
Av. weaning wt.	323 <sup>1/</sup>	361(194 da)	379(221da)
Av. 12 month wt.	611	647(372 " )	613(370 " )
Length of feeding period	190 <sup>2/</sup>	209	209
Feed per cwt. gain (lbs.)	810 <sup>3/</sup>	Angus & Herefords fed together -- 891	
Concentrates	540	538	
Roughage	270	353	
Av. daily gain on test	1.52	1.54	1.55
Av. type score (12 months)	13	10	10

<sup>1/</sup>At 180 days including 180-day weights of calves weaned at 90 days.

<sup>2/</sup>Three calves weaned at 90 days were fed for 280 days. These figures are for calves weaned at 180 days and for the 90-day calves after 180 days of age.

<sup>3/</sup>For calves weaned at 180 days and 90-day calves after 180 days of age.



## PERFORMANCE OF COW HERDS. 1955 CALVES

Maryland Station

Line or group designation Location Breed of sire Breed of dam Number cows bred	University of Maryland University of Maryland	
	Angus Angus 28	Hereford Hereford 31
No. cows calving	27	28
No. calves raised	25	25
Av. inbr. of dams (%)	Outbred	Outbred
Av. inbr. of calves (%)	Outbred	Outbred
Av. birth date	2-16-55	<sup>1/</sup> 2-21-55
Av. birth wt., (lbs.):		
Bulls	59	73 <sup>2/</sup>
Heifers	56	64 <sup>2/</sup>
Were calves creep fed?	Yes	Yes
Av. wt. at six months (lbs.):	199 days	193 days
Steers	438	428
Heifers	396	380
Av. weaning date:		
Steers	10-10-55	10-10-55
Heifers	10-10-55	10-10-55
Av. weaning wt.:		
Steers	534	521
Heifers	475	459
Av. weaning type score:		
Steers	14	13
Heifers	15	12
Av. weaning condition score:		
Steers	12	11
Heifers	12	11

<sup>1/</sup> For calves alive at birth, 2 cows aborted.

<sup>2/</sup> For calves alive at birth.

MISSISSIPPI STATION

- by -

L. C. Ulberg and John McGuire

January 1, 1956

I. Project Title:

A Study to Determine the Breeding Worth of Inbred and Outbred Bulls from Various Sources

II. Objectives:

- (a) To compare the growth rate, carcass qualities and maternal abilities of the progenies of bulls selected from various sources as being potentially superior sires.
- (b) To develop a high producing herd of cows by using the progeny of good producing bulls as replacement heifers.
- (c) To determine the effectiveness of a selection index when used on heifers at weaning time.

III. Accomplishments During the Year:

The calves from 5 bull units (consisting of a total of 154 grade Hereford cows) were dropped during the spring of 1955. Three sources of Hereford bulls were used: (1) two bulls from Montana Line No. 1; (2) one high gaining bull from the Texas Station; (3) two bulls which were termed "commercial." The percent cows calving was 79 with a range between bulls of 69 to 91. Most of these calves will go on feeding trials during the winter and spring of 1955-56. The steers will be slaughtered and 28 heifers from three of the units will be retained to determine differences in maternal abilities between daughters of different bulls.

The second series of bulls consist of: (1) one Montana Line No. 1; (2) high gaining Hereford from Texas Station; (3) a polled Hereford from Georgia Station; (4) a "commercial" Hereford and (5) an Angus from Virginia Station. These bulls have sired calves which will be dropped in the spring, 1956.

IV. Future Plans:

Data on the post-weaning performance of the 1955 calf crop will be collected. Another series of bulls will be used for the breeding season of 1956.

V. Publications During the Year:

None

VI. Publications Planned:

None



## PERFORMANCE OF COW HERDS. 1955 CALVES

Mississippi Station

Line or group designation	Mont. #1 (394)	Mont. #1 (481)	Texas (828)	Comm. (EN 16)	Comm. (EN 45)
Location	-----	-----	Prairie	-----	-----
Breed of sire and dam	Hereford	Hereford	Hereford	Hereford	Hereford
No. cows bred	26	34	31	33	30
No. cows calving	18	31	24	25	23
No. calves raised	17	31	22	24	23
Av. birth date	3-12-55	3-15-55	3-11-55	3-12-55	4-8-55
Av. birth wt. (lbs.):					
Bulls	73	69	62	68	72
Heifers	62	64	65	61	66
Were calves creep fed?	No	No	No	No	No
Av. weaning date (all calves):	11-10-55	11-10-55	11-10-55	11-10-55	11-10-55
Av. weaning wt.:					
Steers	449	422	427	410	395
Heifers	428	416	410	413	388
Av. weaning type score: <sup>1/</sup>					
Steers	10.9	10.8	11.2	11.2	10.9
Heifers	10.8	10.8	11.2	10.9	11.1

<sup>1/</sup>Type grades used:

6-8 -- Medium

9-11 -- Good

12-14 -- Choice

NORTH CAROLINA STATION

- by -

E. U. Dillard

January 1, 1956

I. Project Title:

State 74. The Improvement of Beef Cattle Through Breeding Methods

State 46. The Development of Beef Cattle Especially Adapted to the Coast Plains Region of North Carolina and Similar Areas.

II. Objectives:

- (a) To establish breeding groups of cattle from top crosses of Brahman, Africander and Romo-Sinuano bulls to grade Hereford cows.
- (b) To evaluate the feedlot performance of purebred bulls and heifers of Angus, Hereford and Shorthorn breeds and prospective herd sires of the other breeding groups being established.
- (c) To study total performance of progeny of bulls used in the same herd the same year.
- (d) To study methods of measuring and evaluating performance of brood cows.

III. Accomplishments during the Year:

A total of twenty bull calves were put on rate of gain tests following weaning in the fall of 1954. Eleven of these were weaned on August 4 and full fed a concentrate mixture on pasture and although they had access to hay they consumed very little. The second group of nine bulls was started on feed a month later and was full fed in the dry lot. In the two lots there were 12 Herefords, 1 Angus, 2 Romo Carolina, 3 Africander-Angus-Hereford, 1 Brahman x Hereford, and 1 Shorthorn. All except the Brahman and Africander crosses were fed for 168 days and those were fed 140 days.

At the completion of the performance tests the four top Hereford bulls on the basis of gain and conformation score were put out with the station herds for progeny test. The Shorthorn bull was sold through a purebred sale. One Africander crossbred bull was bred to four daughters of the present sire then slaughtered and one other is being held as a reserve. All others were sent to slaughter market.

There is a growing demand among commercial producers for gain tested bulls but as yet no program of this type with cooperating breeders furnishing bulls to be tested is underway.

Twenty heifers of which 11 were purebred Hereford, 3 Grade Hereford, 3 Aberdeen-Angus and 3 Romo Carolina were full fed on pasture for 168 days post weaning. Three Herefords and one Angus were slaughtered upon completion of the test and others were added to the respective breeding groups.

Through arrangements with local packing firms it is now possible to secure a limited amount of carcass data on progeny groups in the sire testing work.



Detailed carcass data previously taken on samples of the progeny at the college meats laboratory have been temporarily discontinued in favor of the limited data on complete steer progeny groups. Since phenotypic differences between sires are small it is felt the larger sample might better detect the sire differences that exist.

Rather severe environmental conditions as a result of rain storms, temperature and mosquitoes, no doubt, were important factors in the somewhat lowered performance of the cows and calves on the Frying Pan Experimental Range. High water and very large mosquito populations made it seem wise to wean the calves on the area at an earlier age than usual. Gains were very poor after about the middle of July. The percentage calf crop for 1955 was again near 70 per cent which was above the average for this type range. Environmental conditions at other locations were in general more favorable than last year.

All calves born in all station herds are weighed at approximately 28 day intervals as long as the animal remains in the herd. Purebred bulls and heifers are measured at 6, 12 and 24 months of age. More than 200 animals have been measured to date. Some of these data were pooled with that of other stations for a cooperative publication.

Since 1950 progeny performance data have been obtained on progeny of 20 Hereford bulls for pre and post weaning characteristics and on samples of progeny for carcass information.

#### IV. Future Plans:

No major changes in plans are anticipated for 1956 in work previously considered.

A new project is being planned whereby Experiment Station and Extension Service personnel will assist farmers in setting up a performance testing program with the cow and calf herd. A number of farmers will participate actively in the program and from a research standpoint will provide data which will be of value in analysis for evaluating environmental factors of importance in the beef cattle enterprise. Data on performance as measured primarily by weaning weight for age and conformation score of calves will be used for selecting replacement heifers and for culling cows from the herds.

#### V. Publications:

Godley, W. C., 1955. Phenotypic and Genetic Variation and Covariation between certain Traits in Beef Cattle. Ph.D. Thesis. North Carolina State College.

#### VI. Publications Planned:

Selection among Females in a Herd of Grade Hereford Cattle.

POSTWEANING PERFORMANCE OF 1954 CALVES FULL FED AFTER WEANING  
(or pastured for high gains)

North Carolina Station

Line or group designation	Hereford	Angus	Shorthorn	Romo-Carolina	Brahman-Heref.	Africander-Ang.-Heref.	Gr. Hereford
Location	-----	-----	-----	-----	-----	-----	-----
Breeding of calves	Hereford	Angus	Shorthorn	Romo-Carolina	Brahman-Heref.	Afr-Ang-Her	Gr. Hereford
Av. inbreeding (%)	---	---	---	.03	---	---	---
Bulls, No.	9-3 <sup>1/2</sup>	0-1 <sup>1/2</sup>	1-0 <sup>1/2</sup>	1-1 <sup>1/2</sup>	1	3	
Av. inbreeding (%)	---	---	---	.03	---	---	
Av. weaning wt.	502.5	485	570	595	465	460	
Av. 12 month wt.	829.1	820	950	965	760	795	
Len. feeding period	168	168	168	168	140	140	
Feed per cwt. gain							
Concentrates	819-610	610	819	819-610	610 ) Group fed together		
Roughage	308(9)	308	308	308(9)	308 )		
Av. da. gain on test	2.21	1.99	2.86	2.43	2.29	2.30	
Av. type score (12 mo.)	11.4	11.0	10.0	8.0	7.0	7.0	
Heifers, No.	11	3		3			3
Av. weaning wt.	517	542		608			573
Av. 12 month wt.	689	703		753			730
Len. feeding period	168	168		168			168
Feed per cwt. gain							
Concentrates	901 ) Group fed together						
Roughage	232 )						
Av. da. gain on test	1.47	1.30		1.56			1.61
Av. type score (12 mo.)	12.7	11.3		8.0			12.0

<sup>1/2</sup> Eleven head of 11 bulls were pastured and consumed very little roughage. The second group of 9 bulls were fed in drylot. Second figure indicates number in second trial and average feed consumption as animals were group fed.



# PERFORMANCE OF COW HERDS. 1955 CALVES

North Carolina Station

Line or group designation	Hereford	Angus	Shorthorn	Romo - Carolina	Gr. Hereford	Gr. Hereford	Gr. Hereford
Location	Hereford	Angus	Raleigh	Romo-Sinuanox GH	H-360	H-319	H - 62
Breed of sire	Hereford	Angus	Shorthorn	Romo-Sinuanox GH	Gr. Hereford	Gr. Hereford	Gr. Hereford
Breed of dam	Hereford	Angus	Shorthorn	Romo-Sinuanox GH	Gr. Hereford	Gr. Hereford	Gr. Hereford
No. cows bred	40	15	9	9	17	17	18
No. cows calving	35	9	8	8	14	15	18
No. calves raised	32	9	7	7	14	15	16
Av. inbr. of calves (%)	4	--	--	--	--	--	--
Av. birth date					3-12-55	2-6-55	2-5-55
Av. birth wt. (lbs.):							
Bulls	58.7	52.2	61.4	76.5	69.1	74.6	71.8
Heifers	60.8	44.4	61.8	59.7	64.8	67.8	64.0
Were calves creep fed?	No	No	No	No	No	No	No
Av. 6 mo. wt. (lbs.):							
Bulls	348.3	392.5	411.8	480	--	--	--
Steers	--	--	--	--	359.1	384.4	379.7
Heifers	331.1	364.6	406.0	335.7	324.0	350.4	356.6
Av. weaning date:							
Bulls	8-4-55	8-4-55	8-4-55	8-4-55	10-19-55	10-19-55	10-19-55
Steers	--	--	--	--	10-19-55	10-19-55	10-19-55
Heifers	9-23-55	9-23-55	9-23-55	9-23-55	10-19-55	10-19-55	10-19-55
Av. weaning wt.:							
Bulls	425.6	461.7	423.3	532.5	--	--	--
Steers	345.0	375.0	505.0	--	414.4	457.9	474.4
Heifers	408.8	420.0	490.0	467.0	364.0	441.2	445.7
Av. 182 da. type score:							
Bulls	10.6	10.7	10.7	8.0	--	--	--
Steers	9.2	11.0	9.0	--	10.7	10.7	10.7
Heifers	9.8	10.5	10.0	8.0	9.8	10.8	10.9

## PERFORMANCE OF COW HERDS. 1955 CALVES

North Carolina Station

Line or group designation	B-313 Upper Hereford Gr. Heref. 15	B-301 Mountain Hereford Gr. Heref. 18	B-200 Station Hereford Gr. Heref. 4	Gr. Hereford Frying Pan Experiment Hereford Gr. Hereford 29	Br. x GH. F <sub>1</sub> Brahman Gr. Heref. 29 1/2	Br. x GH. F <sub>2</sub> Experiment Range Br. x GH. F <sub>2</sub> Br. x G. H. 31	Af-Ang-Heref. Af-Angus Af. x Herf. 14	Gr. Hereford Raleigh Hereford Gr. Hereford 26
No. cows calving	14	18	3	11	7	26	12	23
No. calves raised	13	18	3	11	7	23	12	22
Av. inbr. of dams (%)	--	--	--	--	--	--	5	--
Av. inbr. of calves (%)	--	--	--	--	--	16	--	--
Av. birth date	1-31-55	2-1-55	2-3-55	2-28-55	3-12-55	3-21-55	3-9-55	
Av. birth wt. (lbs.):								
Bulls	70.7	63.9	65.0	71.5	66.3	51.9	57.0	70.9
Heifers	65.0	58.3	80.0	67.6	84.8	57.8	65.0	62.7
Were calves creep fed?	No	No	No	No	No	No	No	No
Av. 6 month wt. (lbs.):								
Bulls	---	---	---	334.5	285.8	324.7	332.6	---
Steers	366.0	360.7	375.5	---	---	---	---	414
Heifers	338.2	308.9	423.0	284.7	271.3	269.6	327.0	391
Av. weaning date:	9-23-55	9-23-55	9-23-55	9-22-55	9-22-55	9-22-55	9-22-55	9-23-55
Av. weaning wt.:								
Bulls	---	---	---	342.5	295.0	330.4	350.0	---
Steers	462.9	460.0	482.5	---	---	---	---	502
Heifers	440.8	395.0	525.0	301.1	266.7	269.5	337.9	460.9
Av. 182 day type score:								
Bulls	--	--	--	--	--	--	--	--
Steers	11.6	11.8	11.0	--	--	--	--	11.2
Heifers	11.0	10.3	13.0	--	--	--	--	11.3

1/ Same cows as with Hereford bulls.



PRODUCTION AND/OR SLAUGHTER DATA ON YEARLING AND OLDER CATTLE  
NOT INCLUDED IN BREEDING HERDS IN 1955

North Carolina Station

Line or group designation	B-6 <sup>2/</sup>	B-105 <sup>2/</sup>	B-211 <sup>2/</sup>	H-200 <sup>1/</sup>	H-218 <sup>1/</sup>
Breeding	Gr. Heref.	Gr. Heref.	Gr. Heref.	Gr. Heref.	Gr. Heref.
Sex:	Steer	Steer	Steer	Steer	Steer
No.	11	6	3	10	12
Av. age fall 1954 (days)	257	262	266	270	259
Av. wt. fall 1954 (lbs.)	446	454	410	471	490
Av. winter gain (lbs.)	192	184	172	168	168
Days on pasture	---	---	---	182	182
Av. gain on pasture	---	---	---	243	271
Days on feed	143	143	143	---	---
Av. wt. adjusted to 18 or 30 months of age	875	883	797	---	---
Av. gain on feed	364	402	381	---	---
Animals slaughtered:	10	6	3	10	11
Av. slaughter age (mos.)	20.1	20.3	20.4	20.3	20.0
Av. slaughter wt. (lbs.)	1002.0	1040.0	963.0	812.8	855.6
Av. slaughter grade	11.3	12.2	11.0	10.1	10.1
Av. dressing percent	59.6	58.7	58.7	60.2	58.8
Av. carcass grade	11.3	12.3	10.7	10.1	10.9

<sup>1/</sup> During the winter feeding period one-half of each sire progeny group received corn silage + 2 pounds of soybean oil meal per head daily and the other group received 3 pounds of crushed whole corn, one-half pound of soybean oil meal and grass-lespedeza hay ad libitum on pasture. One group received corn free choice and the other group received corn at the rate of one per cent of the body weight.

<sup>2/</sup> Cattle fed in drylot -- Basic ration consisted of corn and cob meal, ground cob, soybean oil meal, molasses, alfalfa leaf meal, minerals, salt and stilbestrol. Five percent animal fat replaced part of corn for one-half of the steers. Average feed per hundred pound gain for all steers was 740 pounds.

SOUTH CAROLINA STATION

- by -

E. G. Godbey

January 1, 1956

The work reported was conducted at the Coast Experiment Station, a branch station of the Clemson College Experiment Station.

The objectives of the test were to determine the birth and weaning weights, animal and carcass grades and dressing percentages of calves out of crossbred and purebred dams.

Thirty-seven calves were produced. The data for each group are summarized in the following table:

DATA ON CALVES SIRED BY SHORTHORN BULL

No. of Calves	Breeding of Dam	Weight		Grade		Dressing %
		Birth	Weaning	Cattle	Carcass	
12	H x A	69	460	Good +	Good +	59.80
12	B x A	63	510	Good +	Good +	59.82
$3\frac{1}{3}$	B x H	55	502	Choice	Choice	62.05
10	Angus	61	469	Good +	Choice-	60.80

$\frac{1}{3}$  Calves out of heifers

The work will be continued through 1956. Eight Brahman x Hereford cows and ten purebred Angus will be added to the group used in 1956.

Reports have been made in the Annual Experiment Station Report and in the report to the Regional Meetings.



## PERFORMANCE OF COW HERDS. 1955 CALVES

South Carolina Station

Line or group designation Location Breed of sire No. cows bred	Angus ----- Shorthorn 12	B x A ----- Shorthorn 12	B x H ----- Shorthorn 3	H x A ----- Shorthorn 12
No. cows calving No. calves raised	10 <sup>1/</sup> 10	12 12	3 3	12 12
Av. birth date	1-30-55	2-3-55	1-14-55	2-5-55
Av. birth wt. (lbs.): Bulls Heifers	64.2 59.0	69.5 59.6	55.0 --	72.4 66.9
Were calves creep fed?	Yes	Yes	Yes	Yes
Av. weaning date; (210 days): Bulls Heifers	8-31-55 8-26-55	8-27-55 9-4-55	8-12-55 --	8-22-55 9-11-55
Av. weaning wt.: Bulls Heifers	503.8 441.4	560.0 485.1	501.7 --	484.0 442.9
Av. weaning type score: Bulls Heifers	Good + Good +	Good Choice -	Choice --	Good + Choice -
Calves slaughtered at weaning: 1. <u>Steer or bull calves</u>				
No.	4	4	3	5
Av. age (days)	215	222	217	217
Av. wt.	510.5	568.2	518.3	489.2
Av. slaughter grade	Good +	Good	Choice	Good +
Av. dressing percent	59.2	58.0	62.0	60.1
Av. carcass grade	Choice -	Good +	Choice	Choice
2. <u>Heifer calves</u>				
No.	5	8	0	7
Av. age (days)	218	214	--	224
Av. wt.	438.4	485.2	--	450.7
Av. slaughter grade	Good +	Choice--	--	Choice -
Av. dressing percent	62.2	60.7	--	59.5
Av. carcass grade	Choice -	Choice -	--	Choice -

<sup>1/</sup> Summary on 9 calves -- one calf not weaned.

TENNESSEE STATION

- by -

Charles S. Hobbs and H. J. Smith

January 1, 1956

I. Project Title:

The Improvement of the Producing Ability of Beef Cattle

II. Objectives:

- (a) To develop lines or line crosses, or combinations of lines and crosses, of beef cattle that will make the most efficient use of Tennessee pastures and forages and that will result in an improvement of such characters as rate of gain, economy of gain, carcass quality, fertility and longevity.
- (b) To develop effective breeding techniques for improving the productiveness of existing lines of beef cattle.
- (c) To investigate productiveness of existing lines of beef cattle.
- (d) To study the effect of different levels of nutrition on the development of type, conformation, economy of gain, fertility and longevity.

III. Accomplishments During Year:

A. Facilities and Cattle Acquired:

Beef cattle breeding research under the Southern Regional Beef Cattle Breeding Project (S-10) is being conducted at several locations within the state with herds at Knoxville, Alcoa (cooperative with Aluminum Company of America), Oak Ridge (University of Tennessee - Atomic Energy Commission), Greeneville, Crossville, Columbia, Springfield and Grand Junction (Ames Plantation). The Angus herd at Ames Plantation (added to the project in 1955) will be used in evaluation of Angus lines, sire testing and in studies on performance selection. The Ames herd will be expanded to approximately 500 cows. Two Angus and five Hereford bulls were purchased from outside herds in 1955 for progeny tests.

B. Research Results:

- (1) During the fall and winter of 1954-55 the Tennessee station group-fed 24 Hereford and 10 Angus bulls under test conditions for 144 days on a high roughage ration. The bulls tested were selected from the calf crops of purebred herds at the main station and substations on the basis of a productivity index which gives equal importance to weaning type grade and weaning weight at a standard age. The feeding test was conducted at the main station at Knoxville under drylot conditions. The bulls were sorted on the basis of weight and fed in groups of 11-12 in concrete lots with access to a barn. The rations fed consisted of concentrates (3 pounds per head daily), alfalfa hay (maximum of 4 pounds per head daily) and corn silage (ad libitum). At the end of the feeding test 16 Hereford and 5 Angus bulls were saved for progeny tests. They were selected on the basis of (1) weaning weight and type grade and (2) performance on post-weaning feeding tests. The average daily gain for the Hereford bulls on performance tests was 1.04 pounds (range, 0.66 - 1.42 pounds) and 1.22 pounds (range, 1.08 - 1.44 pounds) for the Angus bulls.



Progeny test data contributing information to the overall objectives and of specific value in selecting herd sires for the development of inbred lines and outbred herds were obtained on 7 Angus and 29 Hereford bulls in 1955. Differences in weaning weights and grades of calves by different bulls on a within year basis appear to be of sufficient magnitude to be of value in the selection of bulls for use in lines and herds. Analysis of data to estimate sire effects on weaning weights is planned.

Heifer calves at two stations were group fed on performance tests for 140-150 days. The heifers were fed on winter pasture plus 3-5 pounds of concentrates and hay ad libitum. These performance tests with heifers are designed to provide performance information for selection of females to go into the breeding herds and to develop the heifers for use in the breeding herd as replacements. Future plans include similar performance tests of all heifers in the breeding program at all stations.

## (2) Level of Feeding Studies:

The study of the effect of level of nutrition on the development of type, conformation, growth rate, economy of gain, and reproductive efficiency was continued during 1954-55. Trios of heifer calves are being fed on three different nutritional regimes: (1) nurse cow plus a full feed of concentrates and hay, (2) full feed of concentrates and hay and (3) customary practices for good commercial production (grass in summer - limited concentrates and hay during the winter up to 18 months). A summary of the growth data shows, in general, that differences in apparent type and weight between calves on various levels of feeding that are evident at 18 months of age have disappeared at 42-48 months of age (4 years).

## (3) Dwarfism Studies:

The Tennessee Station Project, "The Detection of Animals Heterozygous for Recessive Bovine Dwarfism" was initiated with work in the spring of 1954 on about 65 calves in three progeny groups; two at the Greeneville station and one in the Alcoa herd. Each progeny group was sired by a bull known to carry the recessive gene for dwarfism. Since the dams of these calves must be nearly or completely free of this gene (no dwarf calves were produced), on the average about half of the calves should be carriers and of these calves taken at young ages (0-14 days) and classified according to techniques developed by Hazel and Emerson of Iowa State College are being studied along with other physical characteristics (measurements) in relation to genotype for dwarfism. Examination of the X-rays of these calves indicated a separation into two approximately equal groups. Progeny tests are being conducted to determine whether these groupings are related to the presence or absence of the dwarf genes. During the 1955 breeding, four presumed carrier and four presumed noncarrier bull calves selected from the three progeny groups were each mated to four known carrier cows to test the accuracy of the classification by the X-ray technique. These cows will be kept until they calve to observe whether the progeny of these two X-ray types of bulls conform to expectation so far as the occurrence of dwarf calves is concerned. If the sires were separated correctly, the 16 calves from the four presumed carrier bulls should include around four dwarfs while calves sired by the other bulls should be normal.

All heifers x-rayed in the spring of 1954 were mated in the late spring of 1955 to dwarf bulls for further progeny tests of the X-ray techniques and to produce a number of known heterozygotes. This will permit a study of the kind and extent of vertebral abnormalities which are present in known heterozygotes.



A series of 32 measurements taken at 28-day intervals from birth to about weaning were made on the calves X-rayed in the spring of 1954. Body measurements were standardized to five months of age and summarized by X-ray classifications and sex. In general, measurements for the B type (carrier) calves were intermediate with respect to C type (non-carrier) and A type (dwarf) calves. Ratios of various body measurements were also intermediate in most cases. Average measurements from this summary indicated that the X-ray type carriers had slightly higher type scores and such desired characteristics as shorter heads, cannons and tibias than did the X-ray type non-carriers. The data suggest that a slightly higher percentage of X-ray type carriers would be favored in the selection of breeding stock. A discriminate function was applied to five body measurements including weight, loin width, head length, cannon length and body length. The differences between these functions for the noncarrier and carrier type classifications were significant in both sexes. The significances of these differences suggest a relationship between X-ray classification and the measurements included in the discriminate functions. With the exception of two calves, the separation of carrier from noncarrier females was identical with the separation given by X-ray classifications. However, there was considerable overlap between the measurement functions and the X-ray classifications of the male calves.

All purebred calves in the Angus and Hereford herds and some calves in the grade herds by bulls on progeny tests were X-rayed in the spring of 1955. Approximately 444 calves representing the progeny of 23 Hereford and 3 Angus bulls were X-rayed. Some of the bulls whose calves were X-rayed have proved to be carriers. If the cows in these herds are largely clean and it would appear that such is the case (a few dwarf calves have been produced), then it should be possible to evaluate the genotypes of the bulls with respect to the dwarfism gene on the basis of the X-ray classification of their progeny.

It is planned to continue the study of the X-ray technique for the identification of dwarf carriers with considerable emphasis on progeny tests to determine the accuracy of this method. Investigation of the X-ray technique applied to the cannon bone, tail and other skeletal variations which appear to be promising in differentiating between carrier and noncarrier normal animals is also planned.

#### IV. Future Plans:

- (a) Continue the program of performance and progeny testing of sires.
- (b) Continue the program of cow performance testing in all herds.
- (c) Continue the breeding programs at all stations. The breeding with the Hereford and Angus herds at Knoxville includes a study of the effectiveness of selection based on type, performance and progeny testing in improving productivity. Hereford herds at Greeneville, Springfield and Columbia and the Angus herd at Crossville are being used primarily in a study and comparison of inbreeding, outbreeding and linecrossing. At Alcoa the herd is being used primarily for sire testing with emphasis on performance selection in herd improvement. The herd at Oak Ridge is being used in Hereford line evaluation studies and the progeny testing of sires. A Polled Hereford line is also being developed at this station.
- (d) Continue studies on methods of identification of dwarf carriers. This study will be expanded in 1956 to include considerable progeny testing to check the accuracy of X-ray of the lumbar vertebrae as a method of identification.



V. Publications:

High, Joe W. Relationship of Body Measurements to Genotypes of Bovine Dwarfism as Estimated from X-ray of Lumbar Vetebrae. M.S. Thesis, University of Tennessee, August 1955.

Brown, Dougald E. Relationships Between Type Scores and Live Animal Measurements in Beef Cattle. M.S. Thesis. University of Tennessee, June 1955.

Carrier, Joseph H. Effects of Different Levels of Feeding on Growth and Development in Beef Cattle. M.S. Thesis. University of Tennessee, August 1955.

Smith, H. J., Charles S. Hobbs and E. J. Warwick. New Methods and Techniques to Aid in Selecting Beef Cattle Breeding Stock. AH-VS Mimeo No. 100, October 1955. Tennessee Agricultural Experiment Station.

Smith, H. J., Charles S. Hobbs and E. J. Warwick. Beef Cattle Improvement Program Based on Performance Testing. AH Mimeo 81-55. Tennessee Agricultural Experiment Station.

VI. Publications Planned:

Station bulletin on evaluation of performance in beef cattle. Results of work will be published as progress justifies.

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POSTWEANING PERFORMANCE OF 1954 CALVES FULL FED AFTER WEANING  
(or pastured for high gains)

Line or group designation Location Breeding of calves	- - - - -Performance Testing - - - - -	
	- - - - -Knoxville - - - - -	
	Hereford	Angus
<u>Bulls</u> , No.	24	10
Av. initial wt., (lbs.)	469	470
Av. final wt., (lbs.)	618	646
Len of feeding period <sup>1/</sup>	144	144
Feed per cwt. gain (lbs.):		
Concentrates	258	
Hay	312	
Silage	2733	
Av. daily gain on test	1.04 (.66-1.42)	1.22 (1.08-1.44)
Av. type score (12 months)	11.4 (9.5-12.5)	12.2 (11.0-13.0)

<sup>1/</sup> Group-fed (11-12 bulls per lot sorted only on a weight basis) a ration of concentrates (3 pounds per head daily), alfalfa hay (maximum of four pounds per head daily) and corn silage (ad libitum).

# PERFORMANCE OF COW HERDS. 1955 CALVES

Tennessee Station

Line or group designation Location Breed of sire Breed of dam	Sire Testing										Greeneville		Columbia	
	Angus	Angus	Angus	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
No. cows calving	14	18	9	8	15	5	17	20	21	18	18	16	18	16
No. calves raised	14	18	9	8	15	4	15	16	18	16	18	16	18	16
Av. birth date	10-12-54	2-20-55	3-11-55	4-2-55	3-12-55	3-1-55	3-6-55	3-2-55	2-25-55	2-21-55				
Av. birth wt. (lbs.):														
Bulls	59.2	62.8	71.0	62.5	74.2	70.0	66.7	69.4	61.9	64.0				
Heifers	49.0	59.1	57.0	63.5	64.4	57.3	64.6	63.1	61.2	64.8				
Were calves creep fed?	No	No	No	No	No	No	No	No	No	No			No	No
Av. six month wt.:														
Bulls	365	341	---	304	367	292	340	340	277	286				
Steers	---	---	---	---	---	---	---	---	---	---				
Heifers	270	340	320	341	353	324	326	314	266	272				
Av. weaning date:														
Bulls	5-22-55	9-18-55	---	9-20-55	10-17-55	10-17-55	11-3-55	11-3-55	10-6-55	10-6-55				
Heifers	5-22-55	9-18-55	9-20-55	9-20-55	10-17-55	10-17-55	11-3-55	11-3-55	10-6-55	10-6-55				
Av. weaning weight:														
Bulls	394	385	---	308	430	290	475	458	327	311				
Heifers	353	379	340	322	393	390	420	418	301	327				
Av. weaning type score:														
Bulls	11.9	12.3	---	12.0	11.8	10.0	11.8	11.5	11.1	10.4				
Heifers	12.4	13.1	12.8	12.5	11.8	11.2	11.9	11.4	10.9	10.5				
Av. weaning condition score:														
Bulls	8.9	10.4	---	8.0	9.6	7.0	9.8	9.3	6.1	5.9				
Heifers	11.5	11.9	10.5	10.7	9.8	9.3	10.6	10.1	6.1	6.7				



# PERFORMANCE OF COW HERDS. 1955 CALVES

Tennessee Station

Line or group designation Location Breed of sire Breed of dam	Sire Testing									
	Hereford Hereford	Hereford Hereford	Hereford Hereford	Hereford Hereford	Hereford Hereford	Hereford Hereford	Hereford Hereford	Hereford Hereford	Hereford Hereford	Hereford Hereford
Av. birth date	2-25-55	3-9-55	3-19-55	3-15-55	3-5-55	3-9-55	3-7-55	3-8-55	2-27-55	3-8-55
Av. birth wt. (lbs.): Bulls Heifers	66.3 61.9	58.7 62.6	65.9 64.8	63.4 56.1	66.4 61.0	70.9 69.4	67.8 62.5	64.7 62.4	65.0 61.9	61.6 63.1
Were calves creep fed?	No	No	No	No	No	No	No	No	No	No
Av. wt. at six mo. (lbs.): Steers Heifers	321 211	362 340	358 340	303 295	411 366	400 346	407 347	342 351	360 348	377 358
Av. weaning date:	10-24-55	10-24-55	10-24-55	10-25-55	10-24-55	10-24-55	10-24-55	10-24-55	10-25-55	10-25-55
Av. weaning wt.: Steers Heifers	394 384	428 388	398 378	357 378	511 430	480 418	448 375	405 399	425 406	436 424
Av. weaning type score: Steers Heifers	11.2 11.4	11.2 11.4	11.0 11.3	10.9 10.5	11.9 11.1	11.6 11.3	12.5 12.3	12.2 11.8	11.4 11.9	11.7 11.9
Av. condition score: Steers Heifers	9.4 11.1	9.2 10.3	9.3 10.4	9.4 9.5	10.8 10.4	10.8 10.5	10.9 11.0	10.8 11.0	10.0 10.5	9.5 11.0

## PERFORMANCE OF COW HERDS. 1955 CALVES

## Tennessee Station

Line or group designation Location Breed of sire Breed of dam	Pridemor		MacMor		Sire Testing		Sire Testing			
	Angus	Angus	Angus	Angus	Gr. Her x SH	Gr. Her x SH	Hereford	Hereford	Oak Ridge	Hereford
No cows calving	29	26	25	19	17	17	45	22	16	20
No. calves raised			24	17	17	17	43	21	16	20
Av. birth date	3-12-55	3-12-55	3-20-55	3-17-55	3-10-55	3-10-55	4-13-55	2-25-55	3-24-55	2-21-55
Av. birth wt. (lbs.):							} No birth weights taken.			
Bulls	62.9	57.2	73.7	68.6						
Heifers	59.6	49.0	63.4	72.2						
Were calves creep fed?	No	No	No	No	No	No	No	No	No	No
Av. six months wt. (lbs.):										
Bulls	362	378	479	450	454	454	412	445	379	450
Steers	---	---	420	---	---	---	378	409	340	421
Heifers	349	328								
Av. weaning date:	10-31-55	10-31-55	11-1-55	11-1-55	11-1-55	11-1-55	11-8-55	10-27-55	10-30-55	10-27-55
Av. weaning wt.:										
Bulls	421	425	521	521	490	490	459	541	443	533
Steers	---	---	458	---	---	---	393	490	377	497
Heifers	401	386								
Av. weaning type score:										
Bulls	12.4	12.6	11.7	11.5	11.8	11.8	10.0	11.4	10.7	11.0
Steers	---	---	11.3	---	---	---	10.5	11.1	10.3	10.9
Heifers	12.9	12.5								
Av. condition score:										
Bulls	10.0	10.3	10.9	10.6	11.5	11.5	8.5	9.5	8.6	9.5
Steers	---	---	10.8	---	---	---	8.3	10.5	8.9	10.5
Heifers	11.3	11.2								



# PERFORMANCE OF COW HERDS, 1955 CALVES

Tennessee Station

Line or group designation Location Breed of sire and dam	Sire Testing - - - - - -Oak Ridge - - - - -									
	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Av. birth date	6-5-55	5-12-55	3-15-55	3-27-55	2-26-55	3-6-55	3-20-55	3-27-55		
Av. birth wt.:	-No birth weights were taken - - - - -									
Were calves creep fed?	No	No	No	No	No	No	No	No	No	No
Av. wt. at six months:										
Steers	395	359	372	369	408	411	365(1)	278		
Heifers	357	340	396	380	323	384	390	306		
Av. weaning date:	11-25-55	11-20-55	10-27-55	10-30-55	10-27-55	10-27-55	10-27-55	10-27-55		
Av. weaning wt.:										
Steers	390	379	433	402	483	464	350(1)	314		
Heifers	327	349	450	432	386	449	444	333		
Av. weaning type score:										
Steers	10.5	10.9	10.2	10.2	11.0	10.7	11.0(1)	9.6		
Heifers	11.1	10.9	11.1	10.8	10.3	11.0	10.7	10.4		
Av. weaning condition score:										
Steers	8.2	8.4	8.5	8.3	9.2	9.2	8.0(1)	7.1		
Heifers	8.5	9.1	10.3	10.1	8.4	10.8	10.3	9.4		

# TEXAS STATION

Project 650 and part of Project 607 at Substation 23, McGregor, Texas

- by -

T. C. Cartwright and B. L. Warwick

January 1, 1956

Substation 23 came into being when the Bluebonnet Ordinance Plant was turned over to the Texas A & M College System in 1948. This tract of land is approximately 17,500 acres and is located in a fertile area of Central Texas. The Air Force is in the process of repossessing about 11,000 acres of the original land and leaving the station about 6,500 acres. Negotiations are incomplete and the farm is still utilizing almost all of the farm land. The action of the Air Force has necessitated the removal of offices, feeding pens, and all other farm buildings to a new location on the farm. It has been necessary to fence and develop pastures in new areas and to develop new water facilities. The moving and rebuilding has involved considerable time, trouble and expense.

Considerable work is yet to be done to complete the pasture fences and facilities. At present there are available 20 breeding pastures ranging from about 50 acres to about 300 acres. Some of these are shared by cattle, sheep and goats. There are five large fenced grazing areas that are usually planted in oats and available at certain seasons. Feed lot facilities and feed processing and feeding equipment are available for gain testing up to about 600 head. All of the feed for the livestock is grown on the farm.

The present inventory of cattle shows that there are 388 breeding animals and replacement yearling heifers. The present calf crop numbers 249 head. The breeds represented are the Hereford, Brahman, Santa Gertrudis, Charbray, Red Poll and nine types of crossbreds involving all these breeds except the Charbray. Some of these cattle are on loan to the station. The cattle have been reduced to this number due to the activity of the Air Force. It is anticipated that this number will be increased gradually as pastures are improved.

The experimental work is divided into two projects. The first project is entitled "The improvement of production and adaptation of beef cattle within pure breeds and certain of their crosses through breeding methods". The objectives are:

- (1) The improvement of rate of gain by selection based on weaning weight and gain in the feed lot.
- (2) The improvement of rate of gain in the Brahman breed by crossing with the Hereford and backcrossing to the Brahman with recurrent selection.
- (3) To evaluate cattle with regard to adaptability to environment and to improve production during the hot months by selection based on individual summer gain.
- (4) To determine the magnitude of carcass differences within breeds and the heritability of such differences, to evaluate new crosses and breeds with respect to carcass merit, and to determine the relative potential value of the carcasses of bulls culled from the project.
- (5) To evaluate the significance of hybrid vigor in various crosses and their progeny with regard to gaining ability, carcass value, fertility and adaptability.
- (6) To cull from the herd animals with defects such as dwarfism.
- (7) To make available breeding animals of proven superiority in production.



The second project is entitled "Improvement of cattle through selection of performance-tested and progeny tested sires". This is the gain test project started at Balmorhea in 1942 which has been extended to include Substation 23 and PanTech Farms. This includes only cooperator cattle. Last year 121 cattle belonging to cooperators were tested under this project at Substation 23. In the 1955-56 test the number of cooperators cattle is 201 and Station cattle 233. A group of interested breeders representing about 100 cattle that they desire to have gain tested here contacted us and requested that later dates be set to allow testing of a large portion of their cattle. An additional test will be run, partially overlapping the other and enabling calves born over a larger portion of the year to be tested. During the six years that the gain test has been in use at Substation 23, 1669 calves have been tested. This includes both cooperator and Station calves.

In general the cattle are managed in as practical manner as possible consistent with good experimental technique. It may be helpful to chronologically follow a calf through to maturity. The breeding season has extended from April 10 for three months. The calves, therefore, are dropped from about the last of January until the last of April. At this a rather complete birth record is made for each calf. At about ten days of age the calf is castrated if it is scheduled to be and the birth information checked for errors. The calf is run with his mother until about seven months of age but a 180-day adjusted weaning weight is obtained. All the calves are weighed when the olders is 180 days of age and about every 28 days until the youngest is 180 days of age. At the actual weaning time the calf is dehorned if horned and the branding is completed. After a short holding period the calf is put on the regular 140 days gain evaluation test. This year the regular test starts November 15 after a two week adjustment period and ends April 17. The cooperator cattle are tested concurrently and are intermixed in the pens.

After the animal completes the gain test, he is turned out on pasture if he is a selected breeding animal. Low gainers, other culls and part of the steers are sent to market. All animals below average in gaining ability are sold for slaughter only. A sample of about 40 steers is sent to the meats laboratory at College station. For one year and a part of another it was possible to keep the replacement individuals on shadeless pastures. A weight record taken about every 28 days is continued on the individuals through the summer and into the fall. If possible these weights are continued until the animal goes into the breeding pasture as a two.

During the two year period from birth, young individuals are culled at three principal times:

- (1) At weaning. All below average in adjusted weaning weight are culled. The culled calf may be sold while still carrying bloom or if feed is available he may be entered in the gain test and sold later. Culling at this time with this degree of intensity has been practiced only one year.
- (2) At the end of the gain test all below average of their sex group in pounds gain on the test are culled except for the Brahms since they would have been eliminated. They are kept for their other desirable characters. Previous to the current year selections of females was less intense. With the reduction of the herd this season, females with gain records below the averages of their breed or cross and sex group were culled. Except for some of the Brahms and some of the Red Polls the entire herd of Station owned cattle now have gain test records that are average or above. The cull cattle are sold immediately after the test while their value is still high.



- (3) At the end of the summer after the gain test any individual far below the sex and breed average in pasture gain during the hottest summer months is culled. More study and data are necessary to warrant establishment of definite selection pressure for this character. The most intense selection is on the young animal since this is more practical; however, cows may be culled because of low production records. If a cow misses calving one year she is culled unless she has a very good record otherwise. This culling is practiced several months after the last exposure to the bull which is during the fall to prevent wintering a "dry" cow. Cows and especially bulls are culled because of low progeny records. Animals are culled that have any defect or that have contracted any disease to which a predisposition is suspected of being hereditary, such as cancer eye and actinomycosis infections.

At the end of the gain test a number of steers and bulls are sent to the meats laboratory at A. & M. College where the animals are slaughtered and the carcasses are cut into standard cuts by Dr. O. D. Butler. The main purpose of this work is to determine carcass differences by progeny groups to establish a basis for selection on carcass quality. No consistent differences were found between sire progeny groups that would be of value in aiding selection. Sixty-four Hereford and 94  $F_1$  Hereford x Brahman crossbreds have been slaughtered. Few consistent important differences have been found between these two groups. The crossbreds have consistently been about 2.7 points higher in dressing percent. A close account has been made of the weight and fill of the GI tract which accounts for almost all of the difference in the dressing percent. The Herefords had more fill accounting for 2 points more total shrink and the heavier tract for the remaining .7. Several other interesting aspects have developed from this study. One is the high repeatability of the standard cutting test as determined by cutting both sides of the carcass.

The carcass data are followed up in many instances by cooking tests in the Rural Home Research Laboratory under a project. Analysis and summarization of the carcass data in preparation for publication is nearly complete and this work should be in print within a year. Also included in this work is preparation of a station bulletin coordinating the production, carcass, and cooking or palatability phases of the research projects.

Preliminary observations indicate that the carcasses of bulls compare favorably with that of steers when the bulls are young (about 15 months). This seems to be true for juiciness, flavor and tenderness. The bulls have gained an average of about 0.3 pounds more per day than the steers in the gain test and have weaned at about 25 to 30 pounds heavier weights.

A bulletin and a technical article have been published during the past year primarily concerning gaining ability. In general, high heritability estimates for rate of gain for young growing cattle in the feed lot have been found which range from 21 to 57%. Records of the progeny of selected high gaining bulls are beginning to become available in numbers that are large enough to offer convincing support to the estimates of heritability.

A technical article on the heat tolerance and adaptability studies has been published recently. Several differences in the degree of heat tolerance were found. The only significant difference between individuals within breeds was between gain in weight during the summer months while on pasture lacking shade. The heritability estimate of this character was found to be 19%.



Plans for the future include continuation of the present selection or breeding program with the possible addition of other breeds and their crosses. All of the cattle in the herd with the exception of the Santa Gertrudis and some of the Brahman and Red Polls have gain test records above average. No cattle are to be added to the herd unless they have acceptable gain records; that is, above average. A plan that has worked well in obtaining cattle on a loan basis, is to accept only young heifers or bulls that are of suitable age to be put in the gain test. If they fall below average they are returned to the owner who has gotten six months growth and some information on his calf. The calves that are above average are kept for a period of five years and all of their offspring are the property of the station.

Further analysis and summarization of data and reporting the results in bulletins and articles is anticipated. Included in this category is a study of the rates of growth at different periods (prenatal, preweaning and post-weaning) and the relationship between them. In this study a preliminary observation indicates that the age of dam does not effect the 180 day weight of calves which are from F<sub>1</sub> Hereford x Brahman dams to the same extent as it does the purebred Hereford calves.

Perhaps it is possible to select cows that have enough milk potential so that they produce all a young calf can take and level off about the same regardless of whether they are two's or three's, etc.

## PERFORMANCE OF COW HERDS. 1955 CALVES

Line or group designation	H	B	G	R	1	3	4	9	11	12	13	14	21
Location	McGregor												
Breed of Sire	H	B	G	R	B	H	B	H	G	R	G	R	1
Breed of dam	H	B	G	R	H	1	1	1	H	H	1	1	1
No. of cows calving	69	26	21	7	46	37	28	12	9	11	14	8	7
Were calves creep fed?	No	No	No	No	No	No	No	No	No	No	No	No	No
Av. wt. at 6 mo. (lbs.):													
Bulls (Av. - 408)	397	--	496	--	--	--	--	--	--	--	--	--	--
Number	15		2										
Steers (Av. - 445)	405	383	443	486	466	463	472	432	426	444	469	478	438
Number	19	10	6	2	25	12	14	6	2	6	7	4	2
Heifers (Av. - 414)	369	355	441	447	427	434	415	388	437	413	442	455	444
Number	24	4	8	4	17	15	13	6	7	4	6	4	5
Av. weaning date	-- All calves weaned on October 10, 1955 --												

## POSTWEANING PERFORMANCE OF 1954 CALVES FULL FED AFTER WEANING

McGregor, Texas Station

## Averages by Feeding Groups (Igloo Pens) 4-25-55

Igloo Feed Group (Pen)	Sex	Number of Animal	Breed or Cross	Ave. Days Age	Ave. Wt.	Gain per head		Lbs. feed/head/day	Lbs. feed/100# gain
						Total	Daily		
1	M	4	Angus	432	828	274	2.0		
1	M	3	Charbray	425	1032	362	2.6		
1	M	16	Hereford	422	853	299	2.2		
1	M	3	Charolaise	377	1085	403	2.9		
1	M	2	Red Poll	519	1078	375	2.7		
Average		28		426	910	319	2.3	22	958
2	M	14	Brahman	400	728	288	2.1		
2	M	6	1/2H-1/2B	440	909	353	2.5		
2	M	9	3/4B-1/4H	413	793	296	2.1		
Average		29		412	786	304	2.2	19	888
3	M	6	Santa Ger.	424	975	372	2.7		
3	M	11	3/4H-1/4B	421	898	356	2.5		
3	M	10	3/4H-1/4B	429	882	366	2.6		
Average		27		425	909	363	2.6	21	809
4	S	5	Santa Ger.	437	877	287	2.1		
4	S	22	Hereford	429	774	274	2.0		
4	S	4	Holstein	433	780	361	2.6		
4	S	2	1/2B-1/2Jersey	461	660	235	1.7		
Average		33		433	783	284	2.0	17	819
5	S	10	1/2H-1/2B	424	820	289	2.1		
5	S	8	1/2H-1/2SG	436	821	291	2.1		
5	S	6	1/2H-1/2RP	427	811	309	2.2		
5	S	6	1/4H-1/4B-1/2SG	411	796	280	2.0		
5	S	5	1/4H-1/4B-1/2RP	419	813	267	1.9		
Average		35		424	814	288	2.1	18	871
6	F	33	Hereford	429	712	255	1.8	21	1136
7	F	15	Brahman	422	640	215	1.9		
7	F	13	3/4B-1/4H	417	722	239	2.2		
Average		28		419	678	226	1.9	21	1086
10	F	36	1/2H-1/2B	424	714	250	1.8	19	1071
11	F	5	Angus	448	702	229	1.6		
11	F	3	Red Poll	454	745	250	1.8		
11	F	13	3/4H-1/4B	410	726	236	1.7		
11	F	8	3/4H-1/4B	415	703	251	1.8		
Average		29		423	717	240	1.7	20	1141
12	F	10	1/2H-1/2SG	422	720	281	2.0		
12	F	2	1/2H-1/2RP	437	698	260	1.9		
12	F	5	1/4H-1/4B-1/2SG	417	759	262	1.9		
12	F	7	1/4H-1/4B-1/2RP	436	781	252	1.8		
Average				427	744	267	1.9	19	1012



## KEY TO SOME CODES USED IN THE REPORT - MCGREGOR, TEXAS, STATION

Breed and cross code:

A - Aberdeen-Angus	G - Santa Gertrudis	J - Jersey
B - Brahman	H - Hereford	L - Charolaise
C - Charbray	I - Holstein	R - Red Poll

- 1 -- First cross; unregistered Hereford dams x Brahman sires.  
 3 -- Back cross; first cross (1) dams x Hereford sires. (3/4 Hereford, 1/4 Brahman).  
 4 -- Back cross; first cross (1) dams x Brahman sires. (3/4 Brahman, 1/4 Hereford).  
 9 -- Back cross; unregistered Hereford dams x first cross (1) sires. (3/4 Hereford, 1/4 Brahman).  
 11 -- First cross; unregistered Hereford dams x Santa Gertrudis sires.  
 12 -- First cross; unregistered Hereford dams x Red Poll sires.  
 13 -- First cross dams (1) x Santa Gertrudis sires. (1/2 Santa Gertrudis, 1/4 Hereford, 1/4 Brahman).  
 14 -- First cross dams (1) x Red Poll sires. (1/2 Red Poll, 1/4 Hereford, 1/4 Brahman).  
 99 -- First cross; Brahman dams x Jersey sires.

Sex code:

M = Male	F = Female	S = Steer
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Slaughter grade code for steers (av. of 3 judges):

10 = low commercial	40 = low good	70 = low choice
20 = av. commercial	50 = av. good	80 = av. choice
30 = high commercial	60 = high good	90 = high choice

## INFORMATION CONCERNING FEEDING OF 1954 CALVES

The data presented here are from 356 animals dropped between November 1, 1953 to April 30, 1954. After a preliminary adjusting period of 14 days the calves were self-fed for 140 days, ending April 25.

The primary purpose of these tests is to evaluate the ability of the individual calves to grow or gain under standard conditions. Those bulls and heifers above the averages of their respective groups are prospective herd replacements. Heritability of gaining ability is high, and improvement of progeny in this respect may be rapid if these findings are applied by beef cattle breeders. Heritability has been estimated from all cattle tested previously at Bluebonnet Farm, and is about 50 to 55 per cent.

The calves this year consist of:

- (1) Entries of 95 calves by cooperators, 28 of which are on loan to Bluebonnet Farm.
- (2) A group of 23 heifers and steers raised by the Texas Agricultural Experiment Station at Barnhart, (management of Substation 14) sired by high, low and medium gaining bulls.
- (3) Calves raised in the breeding experiment at Bluebonnet Farm, 238 animals.



The approximate rations were the following:

Growing (Fed all breeding animals)		Fattening (Fed all steers)	
Milo grain	20	Milo grain	60
Cottonseed meal	15	Cottonseed meal	10
Sorghum and Johnson grass hay	40	Sorghum and Johnson grass hay	15
Oats and sweetclover hay	25	Oats and sweetclover hay	15
	100		100

Salt is in one box and bone meal is in another box in each pen. All hay and grain is put through a hammer mill, the ration is blended in a transit mixing truck and is self-fed. There have been changes in the rations of the percentages of the types of hay during the test. Also, Vitamin A concentrate was added to the ration to insure protection against deficiency.

The cattle were all fed in the twelve "igloo" pens but have been separated as far as facilities allow for field day display. Each pen is labeled and the average gains of the cattle posted. Where several breeds are mixed in one pen, each is listed separately. Also, each individual's gain is posted at each pen and a copy may be had upon request.

The average cost of feed per head for the 140 day period was \$55.69. The average feed cost per 100 pounds gain was \$21.78 for the bulls; \$20.88 for the steers; and \$25.86 for the heifers. The last page gives averages by breeds for gain and averages by pens for feed consumption.

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SLAUGHTER AND CARCASS CHARACTERISTICS OF SHORTFED YEARLING,  
HEREFORD AND BRAHMAN X HEREFORD STEERS

Item	Hereford	BrahmanXHereford	Probability of change	Interpretation
			Occurrence	
Number of Steers	59	90		
Live slaughter wt.	743.5	782.2	.001	Crossbreds heavier
Chilled carcass wt.	445.7	490.1	.001	Crossbreds heavier
Chilled dressing percentage	59.9	62.6	.001	Crossbreds higher
Area of eye muscle, unadjusted sq. in.	8.45	9.00	.05	Not much difference per cwt. chilled carcass, Herefords averaged 1.9 sq. in. crossbreds 1.8 sq. in.
Carcass grade	3.5 HG+	4.1 HG-	.1	Little difference if any
Percent hindquarter	49.7	50.2	.01	Crossbreds slightly heavier
Percent forequarter	50.3	49.8	.01	Herefords slightly heavier
Percent rib	8.9	8.9		No difference
Percent short plate	6.8	6.9	.05	Crossbreds very slightly heavier
Percent foreshank	4.4	4.2	.001	Herefords slightly heavier
Percent brisket	4.9	4.8		No significant difference
Percent chuck	25.2	24.9	.01	Herefords heavier
Percent flank	5.6	5.7		No significant difference
Percent full loin, trimmed	16.1	15.6	.01	Herefords heavier
Percent round, rump on	24.7	25.1		No significant difference
Percent cushion round	15.4	15.5	.1	Little difference
High-priced cuts	48.8	49.9		No significant difference
Estimated lean in carcass	58.3	58.6	.05	Crossbreds heavier
Estimated fat in carcass	27.5	26.1		No significant difference
Estimated percent bone	15.4	15.4		No difference

1/Summary of data for 1951, 1952, 1953 and 1954.



PRODUCTION AND/OR SLAUGHTER DATA ON YEARLING AND OLDER CATTLE  
NOT INCLUDED IN BREEDING HERDS IN 1955

Line or group designation Location Breeding Sex	H	R	B	G	C	1	3	4	9	McGregor				H	H	1	11	12	13	14
										11	13	14	14							
No.	15	2	4	1	16	19	5	4	5	8	3	3								
Av. age, 12-6-54	294	331	289	276	302	283	253	271	279	287	275	309								
Av. wt., 12-6-54	450	520	474	500	630	484	464	505	462	448	522	548								
Av. winter gain	283	265	280	315	297	284	275	281	268	286	300	272								
Days on pasture <sup>1/</sup>	218	218	218	218	218	218	218	218	218	218	218	218								
Av. gain on pasture	122	105	136	200	115	164	152	166	165	153	79	130								
Days on feed <sup>1/</sup>	140	140	140	140	140	140	140	140	140	140	140	140								
Animals slaughtered <sup>3/</sup>																				
Av. age at slaughter														10	17	6	4	2	2	1
Av. slaughter grade														442	442	437	442	443	442	417
Av. carcass grade <sup>2/</sup>														40	45	31	35	25	45	25
														14	16	16	16	16	20	22

<sup>1/</sup> These cattle represent the replacement heifers kept after the 1954-55 Gain Evaluation Test. The gain test represents the winter feed period (see other notes). After the test the heifers were maintained on pasture only. The weights reported for pasture gain are from 5-5-55 until 12-6-55.

<sup>2/</sup> United States Department of Agriculture Federal Grades:

8 - Choice +	20 - Commercial +
10 - Choice	22 - Commercial
12 - Choice -	24 - Commercial -

<sup>3/</sup> The carcass information in this table is on calves born in 1955 and slaughtered after weaning.

Project 650 and 607. Publications during the year:

- Bluebonnet Farm Staff, 1955. Final report 1954-55 beef cattle gain evaluation test. Texas Agricultural Experiment Station Misc. Pub. 124.
- Cartwright, T. C., Bruce L. Warwick. 1955. The relationship between birth weight, weaning weight and feed lot gain in beef cattle. Journal of Animal Science 14: 1178 (Abstract).
- Cartwright, T. C., Bruce L. Warwick, H. O. Hill, 1955. Beef Cattle Performance. II Selection based on performance. Texas Agricultural Experiment Station Bul. 815.
- Cartwright, T. C., 1955. Responses of beef cattle to high ambient temperatures. Journal of Animal Science 14: 350-362.
- Patterson, R. E., T. C. Cartwright, J. H. Jones, and J. J. Bayles, 1955. Performance Testing of beef breeding stock. Journal of Animal Science 14: 1034-1041.
- Warwick, Bruce L. and T. C. Cartwright, 1955. Heritability of rate of gain in young growing beef cattle. Journal of Animal Science 14: 363-371.
- Warwick, Bruce L., T. C. Cartwright and M. W. Hazen, 1955. Beef cattle performance at Bluebonnet Farm. I Evaluation tests for gaining ability. Texas Experiment Station bulletin 790.
- Warwick, Bruce L., T. C. Cartwright and M. W. Hazen, 1955. Beef Cattle performance at Bluebonnet Farm. I Evaluation tests for gaining ability. Supplementary tables. Texas Agricultural Experiment Station supplement to Bulletin 790.

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Report of Project 607 at Pan Tech Farms

- by -

Frank H. Sims

At PanTech Farms five years of bull progeny tests have been concluded. Great variations between sire groups and between individuals have consistently been shown. Through five years, 543 young bulls, offspring of 84 herd sires have been tested for ability to gain on a growing ration. Ten percent of these bulls have gained over 400 pounds while fifteen percent have gained less than 300 pounds on 140 day feeding. The high gaining sire groups require considerably less feed per 100 pounds gained than the lower gaining sire groups.

One high gaining and one low gaining bull was purchased at the end of each of the first three years' tests to mate with random selected cow herds. Progeny of the high gaining sires averaged 38 pounds heavier at weaning time than the progeny of low gaining sires. The effect of high gaining sires on stocker heifers also has been demonstrated. At weaning time, heifers sired by high gaining sires were 41 pounds heavier than heifers by low gaining sires. The weight difference at 12 months was 60 pounds and at 18 months, 84 pounds, all in favor of progeny of high gaining sires. These heifers were summered on native grass and were wintered on cottonseed cake and native grass.



"High" and "low" steers have been fed three different years. Consistently the "high" steers have made approximately 36 pounds more gain on 140 day feeding of a growing ration. Feed required per 100 pound gain has been in favor of the high gaining steers, 73 pounds less required.

Following the feeding test, for the last three years, an auction sale has been held by the cooperating breeders. Sale order has been based on feedlot gain and conformation grade 50:50. It was definitely apparent at the sale this year that commercial cattlemen are beginning to demand high gaining sires. It is also apparent that these same cattlemen want a combination of gaining ability and high conformation grade.

Further study of gaining ability is being undertaken. A new project, "A Measure of Inherited Gaining Ability of Beef Cattle" has been set up to extend for a minimum duration of five years. Objectives of this project are:

1. To measure gaining ability of high and low gaining beef cattle.
2. To make a comparison, with regard to weaning weight and grade, stocker gain and grade, feedlot gain and grade, slaughter and carcass characteristics, and general marketability, of four beef cattle herds selected as follows:

- (1) "A" Herd: Selected for high gaining ability, and grade.
- (2) "B" Herd: Selected for high gaining ability.
- (3) "C" Herd: Control herd selected on conformation.
- (4) "F" Herd: Selected for low gaining ability.

For this project, 108 mature cows and 28 replacement heifers have been selected. Of these 108 cows, three years old or older, 107 have given birth to a calf during the 1955 calving season.

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POSTWEANING PERFORMANCE OF 1954 CALVES FULL FED AFTER WEANING  
(or pastured for high gains)

Line or group designation Location Breeding of calves	Pan Tech <sup>1/</sup> Angus	Pan Tech <sup>2/</sup> Hereford	High gain sire PanTech Hereford	Low gain sire Pan Tech Hereford
<u>Bulls, No.</u>	7	97		
Av. initial wt.	608	661		
Av. final wt.	946	1020		
Length of feeding period	140	140		
Feed per cwt. gain (lbs.)	1060	1016		
Av. daily gain on test	2.42	2.56		
Av. type score <sup>3/</sup>	12.4	12.7		
<u>Steers, No.</u>			6	6
Av. initial wt.			530	513
Av. final wt.			886.8	806.8
Length of feeding period			112	112
Av. daily gain on test			2.45	2.21
Av. type score <sup>3/</sup>			11.5	11.3

<sup>1/</sup> Owned by cooperating ranches.

<sup>2/</sup> All but 5 owned by cooperating ranches.

<sup>3/</sup> Grades 8-12 Choice, 12.1-16 Good, 16.1 and over Medium.



Report of Project 607 at Substation 9, Balmorhea, Texas

- by -

John H. Jones

The Balmorhea Station, J. J. Bayles, Superintendent, has feed young breeding cattle, bulls and heifers, the first winter after weaning for cooperators.

The object of this work was to aid in the selection of superior lines of cattle and to identify superior individuals within different lines. Heifers have been fed in addition to young bulls to enable the cooperators to start a herd of superior females. In most small 1 to 2 bull herds, developed after many years of selection, the females usually trace back to only a few of the original females.

The feeding of young stock the first winter after weaning speeds up development, and permits of their earlier use for breeding. Their potential for gain, fattening quality, body conformation and strength of feet and legs, constitutional ability to use feed and temperament are indicated.

The Station developed a method of feeding and economical rations suitable to the satisfactory development of the young breeding stock. The rations produce good rates of gain without excessive fattening. The rations are high in protein, and the mineral intake from the water and feeds grown in the area seems to be ample.

In the 1954-55 data, weight for age at both the outset and close of the test feeding period will be reviewed. Weight for age at the outset is drastically affected by a harsh preweaning environment. The data include a sample of such calves produced in San Augustine County. Apparently individuals from such environment may make high gains in the winter test feeding period, yet still show poorly on the basis of weight for age at the close of the test period. Of the limited population studied at Balmorhea, many of the cattle tended to follow the same pattern of weight increase per day of age as shown at the outset of the feeding period. Those making gains classified as high usually showed an increase in rate over and above that shown at the outset. The reverse held for those making gains classified as low. The increase or margin between weight for age, gain at the outset, and the rate on test feeding was most marked for the cattle from the poorer environments; yet some individuals from the harsh environment failed to respond satisfactorily to the test feeding. A digest of data through a period of years should indicate a rather close range of weights or of weight for age at which the calves should enter the test period within lines of breeding. Apparently the lines of cattle modified through breeding selection to rather extreme shortness and thickness consistently fail to make high gains in the test period, although they may show fair values in weight for age at the outset of the test feeding period.

Contributing Project 714

METHODS FOR MEASURING POTENTIAL RATE OF GAIN AND  
EFFICIENCY OF FEED UTILIZATION IN IMMATURE BEEF CATTLE

- by -

H. O. Kunkel, D. K. Stokes, Jr., E. C. Stutts and J. L. Fletcher

The principal approach in this program of investigation has been the search for a biochemical method of measuring the potential rate of gain in immature beef cattle. Since blood is the easiest tissue to remove from the body without great injury to the animal, the chemical composition of this tissue has received the greatest attention.

The first indication of a relationship between the level of a blood component to the rate of gain was obtained when significant negative correlations were obtained between the serum protein-bound iodine (PBI) value and the rate of gain and efficiency



of feed utilization in a group of ten Hereford bulls (Journal of Animal Science, 12:3, 1953). Studies with other small groups of animals suggested a curvilinear relationship between the PBI (as indicative of thyroid activity) and rate of gain suggesting that an optimum level of PBI was commensurate with maximum gain.

Since the time of this first indication that a biochemical index of potential rate of gain and efficiency of feed utilization was feasible, work has been continued and expanded with major consideration of the relationship rate of gain to the pretest level of serum protein-bound iodine, serum alkaline phosphatase, and blood reduced glutathione.

#### Serum Protein-Bound Iodine

The greatest difficulty encountered in the investigation of the PBI level in the blood serum of young beef cattle was the lack of a laboratory method for the determination of the PBI which would give consistent and reproducible values.

All available methods for the determination of iodine in quantities as minute as occurring in the protein-bound iodine of blood serum involves the detection of iodine as a catalyst in the reduction of ceric ions by arsenious acid. Thus, the iodine is not measured directly but is estimated by the extent it speeds up an unrelated chemical reaction. It is also a reaction which may be accelerated or inhibited by otherwise undetectable contaminants in the system. As a result, the repeatabilities of the method have ranged only between 0.54 and 0.85. Much time has been spent in efforts to develop more reliable methods without any great degree of success.

The method for the PBI determination used for this study is essentially that described by Brown, Reingold, and Sampson (Jour. Clin. Endocrin., 13:444, 1953) using an internal standard. Using this method, analyzing each serum sample in triplicate and considering the average values obtained in the determinations of each sample, statistically significant correlations were obtained between values from samples collected at four to five month intervals in cattle in record of performance tests (table 1). Although the repeatabilities are not as great as might be hoped for, they are of a magnitude which demonstrates relatively permanent differences in the serum PBI level.

The results of attempts over a period of four years to correlate the PBI levels with the rates of gain in record of performance tests are summarized in Table 2. Included are the calculated correlations of data reported in published form (Journal of Animal Science, 12:3, 1953).

It may be seen that the attempts to detect either a simple linear or a curvilinear relationship have not been uniformly successful. However, in addition to 1952 group of bulls described above, two other groups of data, from a group of heifers and from a group of steers, showed statistically significant curvilinear correlations suggesting that in these groups an optimum level of PBI was related with maximum gain.

The serum PBI levels of bovine dwarfs and of compressed types of calves are not significantly different from the levels found in conventional types of calves. It is therefore evident that if the PBI level is indicative of thyroid activity, altered thyroid activity is not responsible for the reduced growth rate of dwarfs and compressed calves, evidence also that factors other than the protein-bound iodine is related to rate of growth or of feed-lot fattening.



It is evident that if the serum PBI level is related in a broad sense to growth rate, it does not have in itself a high predictive value. Yet it is to be noted that in only three of the groups of calves considered the coefficient of variation of the PBI level is above 20% and two of these three groups show the significant curvilinear correlations. This fact suggests that in groups where variation in PBI is very great, a relation to subsequent rate of gain is likely and should be considered along with the factors in developing a predictive index in spite of the inadequacies of the laboratory method of determination of PBI. As an example of such consideration, the curvilinear correlation between PBI and gain for the twenty-eight Brahman heifers of group designated 1954-55 in Table 2 is 0.426, a non-significant value. With these heifers, it was found that the correlation between the pretest gain (calculated by taking initial test weight, subtracting 65 pounds for an assumed birth weight, and dividing by the age in days) was 0.436, a value significant at the 0.05 level. Combining in multiple correlation the curvilinear correlation of PBI and the simple correlation of the pretest gain yields a value for R of 0.664, a correlation of a significance at the 0.01 level of probability and accounting for an appreciable amount of the variation in gain. Thus the assessment of the value of PBI in the prediction of gain in immature beef cattle must be held in abeyance until other factors related to gain can be evaluated more thoroughly. It is with this point in mind that future investigations of PBI and the statistical analyses of the results of investigations are planned.

#### Serum Alkaline Phosphatase in Brahman Cattle

The average serum alkaline phosphatase of cattle of the Brahman breed is approximately twice that of the European breeds (Kunkel, Stokes, Anthony, and Futrell, Journal of Animal Science, 12:765, 1953). In preliminary studies, the correlation between subsequent determinations of phosphatase on the same animals of European breeds was relatively low, but the correlation was of statistical significance in the Brahman breed. In addition, early results indicated a possible relationship between the phosphatase and subsequent gain. These points were of sufficient interest to warrant an extended investigation of the relationship of the serum alkaline phosphatase activity and rate of gain in Brahman cattle.

Data are now available from three years work on the relationship of phosphatase and subsequent gain. Five groups of bulls and five groups of heifers have been involved. In each of the three years one group of heifers and one group of bulls were in the record of performance tests at Bluebonnet Farm. A group of 15 heifers and a group of 27 bulls 7-10 months of age were located at the Vernon Frost Ranch, Simonton, Texas, and were maintained under ranch conditions with some supplemental feeding. Ranch conditions with supplemental feeding were also represented in its treatment of two groups, male and female, of suckling calves located at the J. D. Hudgins Ranch, Hungerford, Texas.

The data are summarized in Table 3. The correlations between the serum alkaline phosphatase and subsequent gain are quite varied ranging from the extremes of 0.626 for a group of Bluebonnet bulls in 1953 to -0.346 for the 1954 Bluebonnet bulls. However, it should be noted that the only statistically significant correlations between phosphatase and gain are positive. These were obtained in the larger groups which might well be considered more adequate and reliable groups.

As data on age and weight at the beginning of the test were available and since the phosphatase is negatively related to age and weight, multiple correlations involving these variables were calculated. Four of the eight multiple correlations were statistically significant and two others approached significance. In all cases the multiple correlations represented substantial increases in the variation attributable to the regression over that of the simple correlation.



The variability of results suggests the need for certain additional investigation. A basic study of the effect of variations in the field conditions under which blood samples are secured would seem desirable in view of some instability in the serum phosphatase. In addition, efforts will be made to secure data from more adequately sized groups of animals maintained under similar conditions at a common location.

### Blood Glutathione

The level of blood glutathione (GSH) in young beef cattle appears to be a characteristic of the animal and it is a highly repeatable measurement (Kunkel, Stutts, and Shrode, Journal of Animal Science, 13:852, 1954). The glutathione in the blood is found almost exclusively in the erythrocyte and it would be expected that the glutathione to hemoglobin ratio (GSH/Hb) to be an even more highly repeatable measurement. Experimentally, this has been found to be true. For example, the correlation between determinations of GSH in samples from a group of Brahman bulls at the beginning and at the end of a 140-day feeding trial was 0.672, a statistically highly significant correlation; however, the repeatability of the GSH/Hb ratio for these same animals was a much higher 0.845. Similar results have been noted in all groups tested.

When the GSH level or the GSH/Hb ratio was extremely high in the Brahman and in the Angus, gain was poor. However, where observations have been made in sufficient numbers to permit statistical analyses, the product-moment correlations were small and not significant statistically. Examples of such data are given in Table 4.

It was noted, however, in the process of testing certain relationships in a group of 30 Brahman heifers where both GSH and PBI values were available, the GSH to PBI ratio was significantly correlated with subsequent gain in a curvilinear manner ( $R = 0.555$ ,  $p < 0.01$ ). This suggested a possible multiple regression of gain on GSH and PBI and therefore the data collected earlier were reevaluated and further blood samples were collected and analyzed in an attempt to detect any curvilinear relationships of the more highly repeatable GSH/Hb ratio to gain. The results of the calculations made thus far are given in Table 4.

The curvilinear correlations of the four groups of Brahman and the Charbray are of sufficient magnitude to be of interest. Statistical significance ( $p < 0.05$ ) was evident in the cases of the larger group of Brahman heifers and of the Charbray heifers. However, the correlation with the Herefords is small and insignificant.

The GSH concentration in the Hereford cattle on test has been found to be established not only by heredity, but the GSH concentration (GSH/Hb ratio) bears small but positive relationships to age, body weight, and the pretest gain. At present, these relationships have not been clearly evaluated, but the evidence at hand indicates although the GSH/Hb may be affected by pretest environmental factors, it is relatively constant during the feeding test period. If this is true, this fact alone would justify further study of the GSH level for it may provide a means of evaluating the pretest conditions which affect record of performance testing.

### Plans for Future Research

The recurrence of statistically significant correlations between the investigated blood constituents and gain is strong evidence that the relationship between certain blood components can be eventually used to form the basis of a predictive index to subsequent gaining ability in cattle. On the other hand, the recurrence of small and insignificant correlations suggests extreme caution in extrapolating the information obtained under one set of conditions to another.



Our present line of thinking in planning future research is that the problem is two-fold:

1. There is a fundamental necessity of developing standardized methods of laboratory analyses wherein values taken at various times during the year can be compared from an absolute as well as the relative standpoint on which comparisons have been made thus far. This involves not only laboratory technique but evaluation of environmental effects on experimental animals.
2. Secondly, it appears that any predictive which may be developed will consider a number of factors. Therefore in addition to the PBI, phosphatase, GSH and hemoglobin, work is planned to include during the coming year, analyses on serum cholesterol and free non-essential amino acid concentration in the plasma.

Multiple regressions will be calculated, and each contributing factor will be evaluated on the extent of its contribution as indicated by the partial regression coefficient.

At the present time, there is still further opportunity to evaluate statistically the data already collected. Time has been the limiting factor in a complete study so far.

It is hoped that a test group of animals can again be assembled at College Station to provide opportunity for a closer study of environmental factors and of the relationship of the blood constituents to the efficiency of feed utilization. Negotiations for such a group is under way at the present time.

The use of the experimental animals in record of performance tests will be continued.

Table 1. Repeatability of Determinations  
of Protein-Bound Iodine Levels in Feed-Lot Cattle

Group Designation	Number	Dates of Sampling	r
Hereford and Angus Steers	14	9/1/53 2/12/54	0.615 <sup>1/</sup>
Hereford & Angus Heifers	16	9/1/53 2/12/54	0.503 <sup>1/</sup>
Hereford & Angus Bulls and Heifers	50	12/10/54 4/29/55	0.509 <sup>2/</sup>
Brahman Bulls & Heifers	29	12/22/54 4/29/55	0.398 <sup>1/</sup>

<sup>1/</sup> Significant at the 0.05 level of probability

<sup>2/</sup> Significant at the 0.01 level of probability



Table 2. Product-Moment and Curvilinear Correlations between the Serum Protein-Bound Iodine Level and Rate of Gain in Herefords and Angus

Year and Group	Sex	Number			Coefficient of Variation of PBI	Correlations	
		H <sup>3/</sup>	A <sup>3/</sup>	B <sup>3/</sup>		Product-Moment	Curvilinear
1952 - 1	Bulls	11	12		21.9	-0.140	0.684 <sup>2/</sup>
1953 - 1	Bulls	11	9		13.4	0.130	0.231
- 2		44	4		18.5	-0.058	0.213
- 3	Heifers	11	7		29.9	-0.420	0.627 <sup>1/</sup>
- 4		20			15.2	0.410	0.460
- 5	Steers	33			16.8	0.122	0.135
- 6		10	12		16.2	-0.228	0.322
1954 - 1	Bulls	12			14.5	-0.088	0.088
- 2	Heifers	11	10		11.6	0.238	0.318
- 3		18			8.4	-0.088	0.209
- 4		36			12.1	-0.022	0.072
- 5				28	11.7	-0.246	0.426
- 6	Steers	7	7		13.0	0.211	0.684 <sup>1/</sup>
- 7		15			24.0	0.237	0.260
1955 - 1	Bulls	78	6		13.1	-0.209	0.214
- 2		12	3		10.1	-0.003	0.338
- 3	Heifers	31	3		14.6	-0.033	0.128

<sup>1/</sup> Significant at 5% level of probability<sup>2/</sup> Significant at 1% level of probability

<sup>3/</sup> Symbols: H = Hereford  
A = Angus  
B = Brahman

Table 3. Phosphatase, Age, Weight, and Gain in Brahman Cattle

Group, Location and year	Sex	No.	Av. Initial Age days	Av. Initial Weight lbs.	Av. Phospha- tase units	Av. Gain lbs.	Product-Moment			Multiple	
							r pg	r ag	r wg	R g.aw	R g.awp
BF '53	M	24	273	516	6.97	242	0.626**	0.191	-0.053	0.208	0.704**
BF '53	F	15	281	441	8.16	185	-0.024	0.156	0.289	0.300	0.333
BF '54	M	15	260	505	6.38	264	-0.346	0.090	0.334	0.343	0.613
BF '54	F	38	262	455	6.01	194	0.447**	-0.414**	0.460**	0.525**	0.794**
BF '55	M	14	260	440	4.43	287	0.071	-0.025	-0.181	0.241	0.247
BR '55	F	15	282	425	4.31	215	0.429	0.192	0.182	0.232	0.657
Frost '55	M	27	246	--	4.33	668 <sup>2</sup> / <sub>2</sub>	0.415* <sup>3</sup> / <sub>3</sub>				
Frost '55	F	15	288	--	5.64	574 <sup>2</sup> / <sub>2</sub>	0.425 <sup>3</sup> / <sub>3</sub>				
Hudgins '55	M	15	90	283	13.07	277	-0.267	0.021	0.615*	0.738**	0.747**
Hudgins '55	F	14	84	244	15.97	235	0.352	-0.141	0.083	0.838**	0.853**

1/ Symbols:

p = phosphatase

g = gain

w = weight

a = age

2/ Weights adjusted to 376 days for bulls and 412 for heifers

3/ Correlation between weights adjusted for age and phosphatase adjusted for initial age.



Table 4. Correlations between the  
Glutathione-Hemoglobin Ratio and Rate of Gain

Year	Breed	Sex	Number	Correlations	
				Product-Moment	Curvilinear
1954	Brahman	Heifers	36	-0.001	0.409 <sup>1/</sup>
		Bulls	15	-0.398	0.507
1955	Brahman	Heifers	14	-0.149	0.489
		Bulls	14	0.500	0.500
	Charbray	Heifers	28	0.149	0.527 <sup>1/</sup>
	Hereford	Bulls	67	-0.033	0.178

<sup>1/</sup> Significant at 0.05 level of probability

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Contributing Project 959

Biochemical and Physiological Anomalies of Bovine Dwarfism  
and Their Use in Detection of Heterozygotes

H. O. Kunkel

The serum protein-bound iodine, the reduced glutathione of blood and the serum alkaline phosphatase levels have been investigated in bovine dwarfs of the Hereford and Angus breeds. The average phosphatase appears to be lower than, the glutathione level greater than, and the protein-bound iodine level no different from the respective levels of so called normal animals. The phosphatase and glutathione levels do not appear to be of diagnostic value because the differences are not very great.

Since the connective tissues are the tissues which appear to undergo the greatest change from a gross inspection, the present emphasis is on a chemical and histological study of these tissues. Skin and cartilage are being studied to the greatest degree. At the present time, not enough normal animals have been included to determine the extent or significance of the differences which may exist. Maximum effort is now being put into this project.

POSTWEANING PERFORMANCE OF 1954 CALVES FULL FED AFTER WEANING  
(or pastured for high gains)

Line or group designation	Substation 9	Substation 9
Location	Balmorhea	Balmorhea
Breeding of calves	Santa Gertrudis	Santa Gertrudis
<u>Bulls</u> , No.	4 <sup>2/</sup>	59 <sup>2/</sup>
Av. wt. 11-5-54	445	597
Av. wt. 4-8-55	828	969
Length of feeding period	154	154
Feed per cwt. gain (lbs.):		
Concentrates	218	245
Roughage	546	655
Av. daily gain on test	2.49	2.41
Av. type score (end of test) <sup>1/</sup>	16.2	12.3
<u>Heifers</u> , No.	4 <sup>2/</sup>	13 <sup>2/</sup>
Av. wt. 11-5-54	476	442
Av. wt. 4-8-55	781	700
Length of feeding period	154	154
Feed per cwt. gain (lbs.):		
Concentrates	280	308
Roughage	713	754
Av. daily gain on test	1.98	1.67
Av. type score (end of test) <sup>1/</sup>	16.2	12.3

<sup>1/</sup>Type scores used:

8 - 14 . . . . .Choice  
14 - 20 . . . . .Good  
20 - & over . . .Medium

<sup>2/</sup>All calves owned by cooperators



## VIRGINIA STATION

- by -

C. M. Kincaid

January 1, 1956

I. First Project Title:

The Improvement of Beef Cattle for Virginia Through Breeding Methods.  
(Paired progeny tests of sires with fast and slow rates of gain).

II. Objectives:

- (a) To estimate heritability of growth rate in beef cattle.
- (b) To study the productivity of stocks of beef cattle now used in Virginia.
- (c) To develop methods of estimating the breeding value with respect to type, growth rate and efficiency of young bulls.

III. Accomplishments During the Year:

- (a) Facilities and cattle acquired - This project was terminated in 1955 and replaced by the study on heterosis.
- (b) Results - The steer calves born in 1954 (24 head) were full-fed in individual stalls for 210 days after weaning and sold for slaughter. The heifer calves (27 head) were roughed through the winter in one group and tested for gaining ability on pasture at the Glade Spring Station in the 1955 grazing season. One pair of sires with progenies in this test had also been used in the previous year. Relative differences for this pair in the second year were similar to those obtained the first year.
  - (1) Heritability of growth rate - A summary of comparisons with 19 different pairs of fast and slow gaining sires over the six-year period of this study indicates that the heritability of growth rate in beef cattle is in the neighborhood of  $1/3$ . Of the 19 pairs of sires, approximately  $1/3$  of the fast gaining bulls and  $2/3$  of the slow gaining bulls sired calves that were below average. This agrees very well with expectation from random pairing of sires on their own performance if heritability is approximately  $1/3$ . The data also indicated that performance up to weaning showed essentially the same picture as postweaning performance when cow differences were equalized by giving each bull in a particular test mating in the same year the same kind of cows (see the 1955 report of annual meeting, S-10 Technical Committee for more details).
  - (2) Growth pattern for non carcass weight - In a study of slaughter data on 622 steers that varied in age from about 6 to 42 months final liveweight was divided into two components - carcass and non-carcass. It appeared that when gains were adequate for growth but not fattening, additional gain increased carcass weight but did not influence non-carcass weight. It appeared that liveweight increase above that required for growth was all added to the carcass, perhaps in the form of fat. The data indicated that absolute values for carcass and non-carcass weight would be more valuable than dressing percentage in the interpretation of results with



meat animals. Data obtained from paired tests of R.O.P. steers in 1954-55 support this hypothesis.

In the last 84 days of the feeding period for the steers on test in 1954-55, two ratios of roughage to concentrates (30:70 and 38:62) were fed to steers paired for weight and previous gain within sire progeny. The ration with the higher level of concentrates increased carcass weight over twice as much as it increased liveweight. Carcass grade also favored the high energy level by 1/5 of a grade. These data indicated that six pounds of extra feed was required for each pound of extra liveweight gain but only 2.72 pounds of feed was required for each pound of increase in carcass weight. The data suggest that for fattening animals, carcass weight and grade may provide more precise information than liveweight (see note at bottom of table on steers fed in Blacksburg).

IV. Future Plans: Project to be discontinued.

V. Publications During the Year:

Kincaid, C. M. and R. C. Carter. Estimates of Heritability of Rate of Gain in Beef Cattle (abstract). Journal of Animal Science 14:1185-86, 1955.

Kincaid, C. M. Weight Increase with Age of Non-Carcass Tissue and Offal as a Measure of Growth in Beef Cattle (abstract). Journal of Animal Science, 14:1186, 1955.

VI. Publications Planned: Station bulletin on Sire Testing.

POSTWEANING PERFORMANCE OF 1954 STEERS FED AFTER WEANING

Line or group designation	Fast(251)	Slow(190)	Fast (12)	Slow (4)
Location	-----Blacksburg-----			
Steers, Number	6	11	3	4
Average 6 months weight	446	406	364	395
Average 12 months weight	763	686	675	646
Length of feeding period <sup>2/</sup>	210	210	210	210
Feed per cwt. gain	1064	1140	1028	1288
Av. daily gain birth to weaning test	2.00	1.77	1.60	1.78
Av. da. gn. weaning to end of feeding/	1.74	1.54	1.71	1.38
Av. type score at weaning <sup>1/</sup>	11.6	11.9	10.8	12.2
Av. condition score at weaning	9.3	9.4	8.5	9.8
Av. live slaughter grade (end of test)	12.2	11.3	11.2	12.0
Av. carcass grade (end of test)	12.2	11.9	10.5	11.6
Final weight	884	808	841	814
Final age	428	440	465	464
Carcass weight	508	470	499	489
Non-Carcass weight	358	330	342	326
Dressing percent	57.5	58.2	59.3	60.1

<sup>1/</sup>Type and condition scores have numerical values for fancy, choice, good and medium of 16, 13, 10 and 7, respectively.

<sup>2/</sup>These steers were individually self fed on a ground mixed ration containing percentages of ingredients at each stage of the feeding period as follows:



	1st. period <u>70 days</u>	2nd period <u>56 days</u>	3rd period <u>84 days</u> <u>Pairs within sires</u>	
Ear corn	50	25	25	15
Mixed hay	40	65	65	75
C. S. Oil Meal	10	10	10	10

The two mixtures fed in the third period were to compare two ratios of roughage to concentrate (30:70 and 38:62) in the rations of fattening steers. Comparisons were made on 11 pairs of half-sibs with pairing based on weight and previous gain. The average differences in favor of the 38:62 ratio were: 12 + 7 pounds for liveweight gain; 26 + 10 pounds for carcass weight; -1 + 7 pounds for non carcass weight; 0.68 + 0.10 points for carcass grade; and 72 + 46 pounds of total feed intake. Extra feed per pound of extra gain was 5.90 for liveweight and 2.72 for carcass weight.

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PRODUCTION AND SLAUGHTER DATA ON YEARLING HEIFERS IN  
PROGENY TESTS OF FAST AND SLOW GAINING SIRES

Line or group designation	Fast (251)	Slow (190)	Fast (12)	Slow (4)
Location	----- Blacksburg -----			
Breeding	AxH	AxH	AxH	AxH
Sex	Heifer	Heifer	Heifer	Heifer
Number	9	7	8	3
Av. age (fall 1954), days	217	227	250	258
Av. weight (fall 1954), lbs.	472	468	496	495
Av. winter gain <sup>1/</sup> , lbs.	141	126	148	95
Days on pasture	168	168	168	168
Av. gain on pasture <sup>2/</sup> , lbs.	228	210	209	187
Av. wt. adj. to 18 or 30 mo. of age	779	716	741	649
Animals slaughtered: <sup>3/</sup>				
Average age at slaughter	587(3)	596(2)	612(3)	623(1)
Average slaughter weight	844(3)	813(2)	853(3)	840(1)
Average slaughter grade <sup>4/</sup>	8.2(9)	8.0(7)	8.0(8)	7.8(3)
Average dressing percent	50.4(3)	53.9(2)	53.7(3)	52.3(1)
Average carcass grade <sup>4/</sup>	8.7(3)	8.5(2)	7.3(3)	8.0(1)

<sup>1/</sup> Fed 3 pounds of concentrates per head per day from weaning in October to April 19 and approximately 10 pounds of hay per head per day from December 1 to the following April 19.

<sup>2/</sup> Pasture was the sole feed from April 19 to October 19, 1955.

<sup>3/</sup> Not all slaughtered. Numbers in parenthesis indicate the number in each average.

<sup>4/</sup> Numerical value of scores or grades of fancy, choice, good and medium were 16, 13, 10 and 7 respectively.

I. Second Project Title:

Number 9371. Heterosis From Crosses Among British Breeds of Beef Cattle.

II. Objectives:

(a) To measure heterosis obtained from crosses among Angus, Hereford and Short-beef cattle as shown by: (1) Growth rate - fattening ability and carcass quality up to approximately 20 months of age. (2) Productive ability of dams.

III. Accomplishments During the Year:

(a) Facilities and cattle acquired - Land has been acquired by the experiment station for the establishment of a new field station which will likely be activated in 1956. Part or perhaps all of the breeding herds in this project will go to that station when it is activated. Forty choice heifer calves of each breed (high grades) were purchased in the fall of 1954 to be developed into breeding cows for this project. The performance of these heifers from weaning to 12 months of age is shown in the tabular material.

(b) Research Results - None

IV. Future Plans:

Seven crossbred calves have been included in the bull feeding work at Front Royal as a source of crossbred bulls for matings to be made in 1956. The first matings will be made in the spring of 1956 using yearling bulls from the bull performance test at Front Royal. Matings were also made at Front Royal in 1955 to produce crossbred bulls for use in this project.

V. Publications During the Year: NoneVI. Publications Planned: None

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PRODUCTION DATA ON YEARLING HEIFERS TO BE COWS IN CROSSBREEDING EXPERIMENT

Location Breeding Sex	-----Blacksburg-----		
	Angus Heifer	Hereford Heifer	Shorthorn Heifer
Number	40	40	39
Average weight 11/2/54	402	382	417
Average weight 4/12/55	510	475	512
Average weight 11/4/55	729	731	744
Average winter gain, 161 days <sup>1/</sup>	108	93	95
Average pasture gain, 206 days <sup>2/</sup>	219	256	232
Total gain, 367 days	327	349	327
Type score <sup>3/</sup> : Fall, 1954	11.8	12.1	12.3
Spring, 1955	12.7	11.8	12.4
Condition score <sup>3/</sup> : Fall, 1954	9.1	8.7	9.1
Spring, 1955	7.1	6.1	6.5

<sup>1/</sup> On pasture with hay until December 21 when they were put on three pounds of supplement per head per day and roughage daily at the rate of two pounds of silage and one pound of mixed hay per hundred pounds body weight.

<sup>2/</sup> Pasture was the sole feed from April 12 to November 4, 1955.

<sup>3/</sup> Numerical value of scores on grades of fancy, choice, good and medium were 16, 13, 10 and 7, respectively.



I. Third Project Title:

Performance Testing of Beef Cattle on the Farms in Virginia

II. Objectives:

- (a) To develop an on-the-farm testing program for beef cattle in which the major emphasis shall be placed on selection criteria for heavy weaning weight, ability to gain rapidly after weaning, desirable type and conformation, regular reproduction, longevity, and carcass quality.
- (b) To obtain data from purebred and commercial herds which may be useful in the development of such a performance testing program.

III. Accomplishments During the Year:

- (a) The Virginia Beef Cattle Improvement Association was formed in January, 1955, with a board of nine directors to guide the program. The directors were appointed as follows: Two by the Virginia Aberdeen-Angus Association, two by the Virginia Hereford Breeders Association, one by the Shorthorn Association, three by the Virginia Beef Cattle Producer's Association, one by the Animal Husbandry Department, VPI. A constitution and by-laws for the association has been drawn and approved by the board members. A meeting of the entire membership of the association is planned for February, 1956.
- (b) The Bland-Giles Hereford Breeders Association voted to enter the Virginia Beef Cattle Improvement Program as a unit. For the past two years this Association has published weight-for-age information on all of the animals in their sale catalog.
- (c) Calves were indexed on the farms of seventy breeders of Aberdeen-Angus, Hereford, and Shorthorn cattle in the performance testing program during 1955. A total of 2482 calves and approximately 300 yearling cattle were indexed. These calves were sired by 241 bulls of the three breeds. Of these, approximately 75 percent were out of registered cows. The information on all calves since the beginning of the program in 1953 is now on IBM cards. The breeders have been furnished a listing by progeny groups of all of his calves in the program during the last three years. They have also been furnished a listing by dams, giving the same information.
- (d) The following table gives a breakdown by breeds the number of breeders, number of sires, and number of calves in the program which were indexed during the year.

BREED	ANGUS	HEREFORD	SHORT HORN	TOTAL OR AVERAGES
Number Breeders	38	29	3	70
Number Sires	145	90	6	241
Number Calves	1563	872	47	2482
Average:				
Age	201	196	191	199
Weight	386	397	359	389
Adjusted Daily Gain	1.68	1.74	1.56	1.70
Type Score	11.6	11.8	10.4	11.7
Index	107	111	96	108



IV. Future Plans:

During the winter all of the data gathered during the past three years will be analyzed carefully to determine if new adjustment factors are needed. The measurement data will be analyzed to determine if such information is of any practical value to the program. The program will be expanded to take in any additional herds in the state who wish to participate.

V. Publications During the Year:

There were no technical publications, but some non-technical articles were published by breed associations and other popular magazines.

VI. Publications Planned:

- (a) Experiment Station publication concerning the technical phases of the program is planned for the coming year.
  - (b) An Extension Service leaflet will also be published for the information of interested breeders.
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I. Fourth Project Title: A Study of Dwarfism in Beef Cattle

II. Objectives:

- (a) To investigate further the hereditary nature of dwarfism in beef cattle.
- (b) To determine whether the same mechanism are responsible for the different types of dwarfism among different breeds.
- (c) To determine the gene frequency for dwarfism in Virginia.
- (d) To discover, if possible, the abnormal physiological action of the dwarf gene.
- (e) To find some method or procedure, whereby the heterozygous animals may be accurately identified in order that the dwarf gene can be controlled or eliminated from the breeding herds.

III. Accomplishments During the Year:

(a) Facilities and cattle -

- (1) Approximately 35 dwarf calves have been assembled during the year for this study. Ten females and three males have been retained for a breeding test in an effort to clarify the confusion that now exists regarding the genetic situation of bovine dwarfism within and among beef breeds. An attempt to breed these females will be made in the spring.
- (2) Ten breeders of purebred Hereford and Angus cattle are cooperating in an attempt to find some means of segregating the progenies of known carrier sires into carrier and non-carrier groups. Segregation criteria include:
  - (A) Growth patterns from observations obtained at approximately three months intervals as follows:
    - (1) Body measurements, including height and chest circumference.
    - (2) Birth weight and periodic body weights from birth to maturity.
    - (3) Type scores, masculinity scores on young bulls and/or other subjective characteristics which appear promising.



- (3) Data are being collected from all herds in the Virginia BCIA program and will be used to (1) obtain estimates of the gene frequency for dwarfism, and (2) for study of the variation in type and degree of expression of dwarfism.

(b) Research results -

- (1) Pathological Studies: Complete necropsies of 22 dwarf and 6 normal calves have been done and gross pathological findings recorded. Glandular materials and other tissues are in preparation for microscopic examination.
- (2) Blood Studies: Blood samples from groups of dwarf and normal calves have been analyzed for serum protein-bound iodine, glucose, and phosphatase activity. No significant differences were found between dwarf and normal calves in their blood constituents.
- (3) Biological Assays: One assay for growth hormone content of the pituitary gland gave a significantly higher potency for the glands from normal calves. Two other assays were conducted in an effort to establish an optimum level of injections of pituitary materials into the assay animals. No significant differences were found in gonadotropic or ACTH content of dwarf and normal calf glands.
- (4) Field Observations: Growth data, type scores, body measurements and masculinity scores on young bulls were collected on more than 275 calves sired by 17 known carrier bulls in 13 herds.

IV. Future Plans:

- (a) Approximately 10 dwarf females of Hereford and Angus breeding will be mated to Hereford, Angus, and Hereford x Angus, cross dwarf bulls in the spring. The observations outlined in 2A (2) and (3) above will be taken at intervals of three months in the herds of cooperating breeders.
- (b) Glandular materials and other tissues collected from the necropsies will be prepared and microscopic examinations made.
- (c) Additional growth hormone assays are planned to determine if a growth hormone deficiency exists in dwarf calves.
- (d) Chemical determinations of blood sample will be made of certain of the mineral constituents, including iron and copper.

V. Publications During the Year:

Some Endocrine Aspects of Dwarfism in Beef Cattle, Journal of Animal Science. (Now at Press)

VI. Publications Planned: None at present.

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I. Fifth Project Title:

The Improvement of Beef Cattle for Virginia Through Breeding Methods<sup>1/</sup>

II. Objectives:

- (a) To establish, maintain and develop herds of beef cattle within the purebreds

<sup>1/</sup> Project title for all work done prior to 1955 at the Virginia Station, but will include only the work at Front Royal after 1955. Tabular data from Middleburg (1954-55) included under this title.



that will be highly adapted to the Appalachian Region, as measured by their ability to utilize grass and rations with limited concentrates. In the efficient production of animals which yield high quality carcasses of desirable type and conformation.

- (b) To estimate the problems to be expected from mass selection as compared with family selection in the improvement of beef cattle.
- (c) To evaluate selection criteria and procedures and develop most precise and effective measures of quality and performance in beef cattle.
- (d) To simplify the methods of progeny or sib testing whereby breeding cattle can be evaluated at comparatively young ages.

### III. Accomplishments During the Year:

- (a) Facilities and cattle acquired - One barn was remodeled and extended to make it suitable for field days, sales and similar activities in connection with the station program. No other important changes in facilities or land occurred. A herd of cattle located at the station on a share basis since 1950 was replaced with station-owned cattle so that the entire breeding herd belongs to either the U.S.D.A. or the state of Virginia.

#### (b) Research Results -

- (1) Breeding herds: Rectal examinations about 90 days after the close of the breeding season indicated that of 431 station-owned cows over 85% were pregnant. Open cows that were culled after pregnancy examinations were assigned to an investigation of the causes of failure to breed. The entire calf crop was vaccinated for Leptospira and blood tests indicated that this disease was now under control. Egg counts on fecal samples from all calves agreed with the previous year and showed general infestation but relatively low counts.

Bulls from Front Royal sired the 1954 calves at the Middleburg Station where the size of the calf crop reflected a carry over from a Leptospira outbreak in 1952. The 1955 calf crop (born July, August and September) at Middleburg was above 90% and indicates that trouble from this source may be under control.

- (2) Post weaning performance tests - Performance tests of promising bull calves were continued with 52 head full-fed individually for 168 days. Surplus yearling bulls not needed in the breeding program and considered good enough for use in commercial herds were sold April 14 at the annual field day. The minimum standard for each surplus bull to go in the sale was the equivalent of 1.9 pounds per day gain and a type score of 11 (good +). Performance information was furnished for each bull at the time of sale and it appeared this information influenced the prices paid.

The heifer calves (97 head) were tested in groups for rate of gain in the winter feeding period for 140 days on corn silage free choice with limited grain and hay. Following the winter test period they were grazed on pasture alone. Average daily gains were much higher in the winter test period than when they were grazed on pasture alone. This suggests that the quality of pastures at this station need improving for maximum pasture gains by yearling cattle.

#### (3) Foundation herds -

- (a) Shorthorns: In all four or five foundation sets are needed. Two are already in production, a third set was completed in 1955 and matings have been made to proven sires for a fourth and fifth set.



- (b)Angus: One set in production and a second completed in 1955.
- (c)Hereford: One set made and discarded due to dwarfism; a second set expected to be completed from 1955 matings and progeny tests to be completed in 1956 on four prospects which include a Miles City Line 1 and a polled Hereford from the Tifton Georgia line.
- (4)Repeatability of type scores - A study was made of the type scores of 102 heifers scored by the same judges at three different times with at least 3 months between scorings. Repeatability of type score ranged from .34 to .67 for heifers in each of three breeds. The interaction of calf with time of scoring was relatively large and indicated that the average of two or more scores taken at different times is desirable for better evaluation of type in the individual animal. (See 1955 report of annual meeting, S-10 Technical Committee).
- (5)Dwarfism matings - Calves born in 1955 from three types of matings between different kinds of carriers suggested that the same loci may be involved in dwarfism observed in conventional Herefords, Comprest Herefords and one kind of Angus (see 1955 report of annual meeting, S-10 Technical Committee).
- (6)Estimating birth weight from chest circumference - The relation of birth weight to chest circumference was studied from data on 1,034 calves born at Front Royal from 1950 to 1954 inclusive. Birth weight was essentially linear with chest circumference in these data and the results indicated that a linear equation was satisfactory for the approximation of birth weight from chest circumference. The standard deviation of birth weight within sub-class was 8.75 pounds for observed values and 4.10 pounds after adjustment for regression (see 1955 report of annual meeting, S-10 Technical Committee).
- (7)Influence of calving data on subsequent calving - Data on cows that calves one year and failed to conceive the next showed that the fraction failing to calve increased as previous calving date advanced from January to June. The data included 797 calvings in all three breeds and the percentage of conception failures by months from January to June were 10, 11, 19, 25, 38 and 43, respectively.

#### IV. Future Plans:

The number of breeding cows will be kept at about 450 with major emphasis on completion of foundation sets in the Shorthorn breed and sire proving in the Angus and Hereford breeds.

Performance testing will be continued with about 50 bulls (10 from outside herds), all heifer calves raised at the station and 40 steers in 1956. It is expected that 20 bull calves from outside sources can be purchased each year after 1956 and that all steer calves raised can also be fed and/or grazed out. It is also expected that a fertilication and pasture improvement program can be started and carried out in order to improve the quality of forage, particularly for yearling cattle.

#### V. Publications During the Year:

Burris, M. J. and B. M. Priode. Permanency of Conformation Scores Placed on Beef Heifers (abstract). Journal of Animal Science 14:1177, 1955.

Beef Cattle Research Station - Field Day and Sale Catalogue, April, 1955.  
Summary R. O. P. Tests, mimeographed, April, 1955.

Agricultural Research Service, U.S.D.A. Learning to Breed Better Cattle.  
Agricultural Research Apr. Res. 1955, p. 3-5. Breeding Better Beef Cattle  
N.B.C. Television Film Strip and Clear Channel Radio Network.

# VI. Publications Planned for Next Year:

Field Day and Sale Catalogue, Summary R. O. P., and Results of Analysis of  
Data as Completed.

## POSTWEANING PERFORMANCE OF 1954 CALVES FULL FED AFTER WEANING

Location Breeding of calves Av. inbreeding <sup>1/</sup>	Front Royal Angus	Front Royal Hereford	Front Royal Shorthorn
<u>Bulls, Number</u>	13	17	22
Av. weaning wt.	438	406	400
Av. 12 month wt.	839	746	796
Feed per cwt. gain <sup>2/</sup>	795	770	789
Av. daily gain on test	2.41	2.14	2.46
Av. type grade (12 months)	11.7	11.4	11.0
<u>Heifers, Number</u>	36	40	29
Av. weaning wt.	355	335	346
Av. 12 month wt.	621	573	602
Length of feeding period	140	140	140
Feed per cwt. gain <sup>3/</sup>			
Concentrate	364	361	325
Roughage	1715	1559	1719
Av. daily gain on test	1.52	1.54	1.71
Av. type score (12 months)	11.8	10.9	11.8

<sup>1/</sup> Inbreeding not calculated.

<sup>2/</sup> Feed mixture for bulls was 50% ear corn, 20% alfalfa hay, 20% orchard grass hay, 5% cottonseed meal, 5% linseed meal for first 112 days; and 70% ear corn, 10% alfalfa hay, 10% orchard grass hay, 5% cottonseed meal and 5% linseed meal for last 56 days.

<sup>3/</sup> Feed mixture for heifers was 40% ground ear corn, 20% orchard grass hay, 20% alfalfa hay and 20% cottonseed meal. Animals were allowed all the corn silage they would consume.



PRODUCTION DATA ON YEARLING CATTLE NOT INCLUDED IN BREEDING HERDS IN 1955

Line or group	Test	Founda- tion	Test	Founda- tion	Test	Founda- tion	Test	All	All
Location	Front Royal	Front Royal	Front Royal	Front Royal	Front Royal	Front Royal	Front Royal	Middle- burg	Middle- burg
Sire	1162	057	870	171	59	161	161	----	----
Breeding	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus
Sex	Female	Female	Female	Female	Female	Female	Female	Steer	Heifer
Number	8	12	9	2	2	3	3	9	4
Av. age (11-3-54)	248	255	208	271	334	222	222	212	210
Av. wt. (11-3-54)	390	429	446	487	572	431	431	420	419
Av. gain on R. O. P. <sup>1/</sup>	205	205	237	216	228	188	188	----	----
Days on R. O. P.	140	140	140	140	140	140	140	----	----
Days on pasture	188	188	188	188	188	188	188	222	222
Av. gain (pasture)	159	117	131	98	77	126	126	212	176
Av. daily gain (pasture)	.85	.59	.70	.52	.41	.67	.67	.96	.79
Av. 18 months weight <sup>2/</sup>	705	709	802	748	818	724	724	567	541

<sup>1/</sup> Calves are fed six pounds each daily of a ration of 2 parts ear corn, 1 part alfalfa hay, 1 part orchard grass hay, and 1 part cottonseed meal ground and mixed together and all the corn silage they will consume, (see attached report of 1954-55 feeding tests).

<sup>2/</sup> Weight adjusted to 18 months of age on basis of pasture gain per day based on one spring and one fall weight.

<sup>3/</sup> Weaned 3-18-55 and put on pasture two weeks later.

## PRODUCTION DATA ON YEARLING CATTLE NOT INCLUDED IN BREEDING HERDS IN 1955

Line or group	Foundation	Test	Foundation	Test	Foundation	Test	Test	Test
Location	- - - - - Front Royal - - - - -							
Sire	52	869	863	31	441	V68	023	
Breeding	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford	
Sex	Female	Female	Female	Female	Female	Female	Female	
Number	5	1	1	13	4	6	2	
Av. age (11-3-54)	239	245	258	242	262	233	271	
Av. weight (11-3-54)	342	380	520	382	443	412	437	
Av. gain on R. O. P. <sup>1/</sup>	203	233	235	215	220	225	201	
Days on R. O. P.	140	140	140	140	140	140	140	
Days on pasture	193	193	193	193	193	193	193	
Av. gain (pasture)	157	161	146	149	166	148	145	
Av. daily gain (pasture)	.81	.83	.76	.77	.86	.77	.75	
Av. 18 months weight <sup>2/</sup>	662	721	841	702	753	737	714	

<sup>1/</sup> Calves are fed six pounds each daily of a ration of 2 parts ear corn, 1 part alfalfa hay, 1 part orchard grass hay, and 1 part cottonseed meal ground and mixed together and all the corn silage they will consume, (see attached report of 1954-55 feeding tests).

<sup>2/</sup> Weight adjusted to 18 months of age on basis of pasture gain per day based on one spring and one fall weight.



PRODUCTION DATA ON YEARLING CATTLE NOT INCLUDED IN BREEDING HERDS IN 1955

Line or group	A-1 Inbred	B-1 Inbred	Growth	Type	Foundation	Test	Test
Location	-----Front Royal-----						
Sire	885	663	940	B287	T44	114	908
Breeding	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn
Sex	Female	Female	Female	Female	Female	Female	Female
Number	5	2	6	1	8	6	1
Av. age (11-3-54)	268	255	252	301	246	240	182
Av. wt. (11-3-54)	461	346	419	430	407	367	272
Av. gain on R.O.P. <sup>1/</sup>	244	276	256	193	228	231	248
Days on R. O. P.	140	140	140	140	140	140	140
Days on pasture	206	206	206	206	206	206	206
Av. gain (pasture)	95	93	109	107	117	121	130
Av. daily gain (pasture)	.463	.449	.527	.519	.567	.588	.631
Av. 18 mos. wt. <sup>2/</sup>	799	700	795	700	749	731	676

<sup>1/</sup> Calves are fed six pounds each daily of a ration of 2 parts ear corn, 1 part alfalfa hay, 1 part orchard grass hay, and 1 part cottonseed meal ground and mixed together and all the corn silage they will consume, (see attached report of 1954-55 feeding tests).

<sup>2/</sup> Weight adjusted to 18 months of age on basis of pasture gain per day based on one spring and one fall weight.

## PERFORMANCE OF COW HERDS. 1955 CALVES

Line or group	917	59	960	940	917	960	940	057	420	890	1162	1162
Location	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus
Breed of sire	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus
Breed of dam	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus	Angus
No. cows bred	9	1	6	5	9	6	7	25	24	20	--	17
No. cows calving	71/	1	6	5	7	4	6	24	20	17	4	12
No. calves raised	81/	1	6	5	6	3	5	24	19	15	2	11
Av. inbr. of dams (%)	.013	.019	--	--	--	--	--	--	--	--	--	--
Av. inbr. of calves (%)	.142	.276	--	--	--	--	--	--	--	--	--	--
Av. birth date (1955)	2/22	1/6	2/14	2/11	2/22	3/12	3/5	2/21	2/11	2/5	2/264/	2/263/
Av. birth wt. (lbs.)	49	--	60	55	60	62	61	59	69	66	60	74
Bulls	47	54	64	48	--	37	52	54	56	62	67	62
Heifers	No	No	No	No	No	No	No	No	No	No	No	No
Were calves creep fed?	368	--	397	378	427	389	427	414	434	396	277	431
Av. wt. at 6 months (lbs.)	--	--	371	362	385	355	--	385	364	350	--	--
Bulls	348	348	409	309	--	--	341	375	341	375	302	372
Steers	9/27	9/27	9/27	9/27	9/27	9/27	9/27	9/27	9/27	9/27	9/29	9/29
Heifers	446	--	475	419	493	387	497	486	505	488	335	494
Av. weaning date (1955)	--	--	456	437	452	387	--	426	438	429	--	--
Av. weaning weight	381	480	475	396	--	--	334	446	421	461	367	428
Bulls	12.5	--	13.2	13.0	13.3	10.0	11.3	11.8	11.7	11.7	Not	11.2
Steers	--	--	9.6	10.9	10.6	8.6	--	11.5	11.0	10.5	Scored	--
Heifers	13.0	13.8	12.0	12.1	--	--	12.3	12.6	11.0	12.0	"	12.0
Av. weaning type score	10.2	--	10.8	10.5	10.9	8.9	10.2	10.1	10.2	10.0	"	10.1
Bulls	--	--	9.0	9.6	9.3	8.0	--	9.8	9.4	9.0	"	--
Steers	11.0	12.5	10.5	10.1	--	--	9.8	11.3	10.1	11.0	"	10.8
Heifers												

See last table for footnotes.



PERFORMANCE OF COW HERDS. 1955 CALVES

Line or group	26	Test 357	Test 310	Test 322	52	988	202	31	31	85(A-D)	663(B)
Location	Heref.	Heref.	P. Heref.	P. Heref.	Heref.	S. Horn	Heref.	Heref.	Heref.	S. Horn	S. Horn
Breed of sire	Heref.	Heref.	P. Heref.	P. Heref.	Heref.	S. Horn	Heref.	Heref.	Heref.	S. Horn	S. Horn
Breed of dam	Heref.	Heref.	P. Heref.	P. Heref.	Heref.	S. Horn	Heref.	Heref.	Heref.	S. Horn	S. Horn
No. cows bred	25	17	17	17	31	18	17	0	32	16	17
No. cows calving	18	6	12	13	21	16	0	3	19	12	9
No. calves raised	18	6	11	13	20	15	0	3	18	12	7
Av. inbr. of dams (%)	--	--	--	--	--	--	--	--	--	.089	--
Av. inbr. of calves (%)	--	--	--	--	.075	--	--	.25	--	.223	--
Av. birth date (1955)	2/17	3/4	3/2	3/21	2/24	2/3		2/7	2/23	2/22	2/23
Av. birth wt. (lbs.)											
Bulls	66	71	74	73	66	62		49	61	78	70
Heifers	64	64	71	67	62	68		40	61	68	67
Were calves creep fed?	No	No	No	No	No	No		No	No	No	No
Av. weight at 6 months (lbs.)											
Bulls	396	406	457	448	389	374		193	301	374	349
Steers	351	--	--	399	--	319		--	328	320	289
Heifers	356	379	369	382	328	366		197	302	324	294
Av. weaning date (1955)	9/26	9/23	9/24	9/24	9/22	9/28		9/29	9/26	9/28	9/28
Av. weaning weight											
Bulls	451	484	488	480	416	489		220	371	421	423
Steers	444	--	--	392	--	350		--	341	393	319
Heifers	391	393	412	381	377	456		249	345	362	310
Av. weaning type score											
Bulls	10.7	11.8	12.4	12.1	10.8	12.3		Not	10.4	10.8	10.7
Steers	11.0	--	--	12.0	--	9.0		Scored	11.5	8.6	9.4
Heifers	11.2	10.4	12.0	12.5	11.1	11.6		"	10.2	11.1	8.7
Av. weaning condition score											
Bulls	9.5	9.6	10.1	10.4	9.5	10.1		"	8.7	8.8	8.4
Steers	9.8	--	--	10.5	--	7.0		"	9.6	6.7	7.7
Heifers	10.2	8.5	10.1	10.1	9.2	10.6		"	9.3	9.5	7.5

See last table for footnotes.

## PERFORMANCE OF COW HERDS. 1955 CALVES

Line or group	1009 Growth	989 Type	T44	114	940	057	161	BWB
Location	- - - - - Front Royal - - - - -					- - Middleburg - -		
Breed of sire	S. Horn	S. Horn	S. Horn	S. Horn	S. Horn	Angus	Angus	Angus
Breed of dam	S. Horn	S. Horn	S. Horn	S. Horn	S. Horn	Angus	Angus	Angus
No. cows bred	25	15	32	33 <sup>6</sup>	33 <sup>6</sup>			
No. cows calving	20	14	28	17	12			
No. calves raised	18	11 <sup>4</sup>	23	14	12	18	6	10
Av. inbr. of dams (%)	--4/	--4/	--4/	--4/	--4/	--4/	--4/	--4/
Av. inbr. of calves (%)	--4/	--4/	--4/	--4/	--4/	--4/	--4/	--4/
Av. birth date (1955)	3/2	2/12	2/10	1/23	3/14	8/15 <sup>4</sup>	7/30 <sup>5</sup>	5/5 <sup>4</sup>
Av. birth wt. (lbs.)								
Bulls	70	68	65	75	71	60	45 <sup>8</sup>	60
Heifers	67	65	63	66	71	48	53	54
Were calves creep fed?	No	No	No	No	No	8/	8/	8/
Av. weight at six months (lbs)								
Bulls	396	381	357	355	377	377	303	371
Steers	344	312	325	310	334	---	---	---
Heifers	337	347	336	317	367	323	322	349
Av. weaning wt.								
Bulls	441	460	436-	453	419	409	352	448
Steers	377	369	386	408	344	---	---	---
Heifers	370	409	391	405	392	381	409	406
Av. weaning date (1955)	9/28	9/28	9/28	9/28	9/28	3/18	3/18	3/18
Av. weaning type score								
Bulls	10.9	12.4	11.5	11.2	12.4	11.0	9.3	10.8
Steers	10.5	10.9	10.9	10.2	10.3	--	--	--
Heifers	11.3	10.9	10.9	10.7	11.0	11.8	12.0	11.0
Av. weaning condition score								
Bulls	9.2	10.3	9.3	9.2	10.1	--	--	--
Steers	8.0	8.3	8.8	7.8	8.0	--	--	--
Heifers	9.6	9.5	9.2	9.2	9.3	--	--	--

<sup>1</sup>/ Includes one set of twins

<sup>2</sup>/ Information only on dwarf progeny

<sup>3</sup>/ Information only on non-dwarf progeny

<sup>3a</sup>/ No inbreeding in 6 head, others sire x daughter mating.

<sup>4</sup>/ Inbreeding not calculated

<sup>5</sup>/ Six from sire x daughter mating, no inbreeding in others.

<sup>6</sup>/ Sire 114 was injured and replaced by sire 940 in the breeding herd 5/11/55.

<sup>7</sup>/ This bull was sterile -- no calves obtained.

<sup>8</sup>/ One-half of each progeny was creep fed and the other half not. Dams and their calves fed in dry lot during the wintering period.









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S-10, IMPROVEMENT OF BELF CATTLE FOR THE SOUTHLRN REGION  
THROUGH BREEDING METHODS

- REPORT OF -

ANNUAL MEETING S-10 TECHNICAL COMMITTEE

HELD AT COLLEGE STATION, TEXAS

August 6 - 9, 1956

DOCUMENTATION  
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## 1956 S-10 TECHNICAL COMMITTEE MEETING

The 1956 S-10 Technical Committee meeting was held at Texas A & M College, College Station, Texas August 6 - 9, 1956. The meeting was called to order by Chairman Bruce L. Warwick at 8:15 a.m. August 6. Chairman Warwick introduced Vice-Chancellor D. W. Williams of Texas A & M who gave the group a cordial welcome to Texas for their meeting. In his remarks Dr. Williams pointed out that any business with no basic change for a long time was either in trouble or would be in trouble. In reviewing some of the things that had been accomplished in beef cattle breeding he pointed out that cattle had been made smaller (perhaps too far in this direction) in a process of grading up which improved carcass quality and yield but made little or no change in efficiency. He emphasized that the breeder needed to select and breed cattle that will get the job done on the home farm. Dr. Williams suggested the following areas which needed investigation: 1) increased efficiency; 2) adaptation to local conditions; 3) revision in the marketing system; 4) consideration of what the consumer wants; 5) efficiency under standard rather than specific conditions.

Each person present was asked to introduce himself. One foreign visitor, Dr. F. N. Bonsma, Union of South Africa, gave the group a brief description of cattle breeding in the different districts of the Union of South Africa and indicated that one important problem in beef cattle improvement in South Africa was breeding for adaptation to climatic conditions.

The following Technical Committee members and guests were present:  
(Technical Committee members designated by \*, acting by \*\*)

- \* W. M. Warren, Ala. Agr. Exp. Station, Auburn, Alabama
- C. J. Brown, Ark. Agr. Exp. Station, Fayetteville, Arkansas
- \* Warren Gifford, Ark. Agr. Exp. Station, Fayetteville, Arkansas
- \* Marvin Koger, Florida Agr. Exp. Station, Gainesville, Florida
- H. V. Clum, Agr. Ext. Service, University of Georgia, Athens, Georgia
- T. M. Clyburn, Georgia Agr. Exp. Station, Reidsville, Georgia
- W. C. McCormick, Georgia Agr. Exp. Station, Tifton, Georgia
- \* B. L. Southwell, Georgia Agr. Exp. Station, Tifton, Georgia
- \* R. S. Damon, Jr., Louisiana Agr. Exp. Station, Baton Rouge, Louisiana
- G. L. Robertson, Louisiana Agr. Exp. Station, Baton Rouge, Louisiana
- E. H. Vernon, U.S.D.A., Jeanerette, Louisiana
- \*\* William Green, Maryland Agr. Exp. Station, College Park, Maryland
- \* T. B. Patterson, Mississippi Agr. Exp. Station, State College, Mississippi
- B. G. Ruffin, State College, Mississippi
- \* E. U. Dillard, North Carolina Agr. Exp. Station, Raleigh, North Carolina
- Joe V. Whiteman, Oklahoma A & M, Stillwater, Oklahoma
- \* E. G. Godbey, South Carolina Agr. Exp. Station, Clemson, South Carolina
- W. C. Godley, South Carolina Agr. Exp. Station, Clemson, South Carolina
- C. M. Kincaid, U.S.D.A., Knoxville, Tennessee
- \*\* H. J. Smith, Tennessee Agr. Exp. Station, Knoxville, Tennessee
- O. D. Butler, Texas Exp. Station, College Station, Texas
- T. C. Cartwright, Texas Agr. Exp. Station, McGregor, Texas
- Sylvia Cover, Texas Agr. Exp. Station, College Station, Texas
- E. K. Crouch, Lufkin, Texas
- H. O. Kunkel, Texas Agr. Exp. Station, College Station, Texas
- R. D. Lewis, Texas Agr. Exp. Station, College Station, Texas
- B. L. Lisenbe, Texas Agr. Exp. Station, College Station, Texas
- L. A. Maddox, Texas Agr. Ext. Service, College Station, Texas



- A. A. Melton, Texas Agr. Exp. Station, Balmorrhea, Texas  
 R. E. Patterson, Texas Agr. Exp. Station, College Station, Texas  
 R. R. Shrode, Texas Agr. Exp. Station, College Station, Texas  
 J. P. Smith, Farm Manager, PanTech Farm, Panhandle, Texas  
 R. L. Smith, Texas Agr. Exp. Station, College Station, Texas  
 \* Bruce L. Warwick, Texas Agr. Exp. Station, McGregor, Texas  
 Martin J. Burris, Virginia Agr. Exp. Station, Front Royal, Virginia  
 \* G. W. Litton, Virginia Agr. Exp. Station, Blacksburg, Virginia  
 T. J. Marlowe, Virginia Agr. Exp. Station, Blacksburg, Virginia  
 B. M. Priode, U.S.D.A., Front Royal, Virginia  
 W. E. Shaklee, U.S.D.A., Washington, D. C.  
 E. J. Warwick, U.S.D.A., Washington, D. C.  
 Walter R. Harvey, U.S.D.A., Washington, D. C.  
 Dr. F. N. Bonsma, Chief, Division of Animal Industry, Pretoria, South Afr

The chairman appointed the following Resolutions Committee:

W. C. Godley, Chairman  
 E. U. Dillard  
 E. H. Vernon

The meeting was turned over to Dr. T. C. Cartwright who directed the statistical workshop from 9:00 a.m. to August 6 until noon, August 7. (see page 9 for program of the workshop)

The Executive Committee followed the practice established in 1954 which provided for each state to give a progress report every other year. (Copies of these reports and material presented by other speakers can be located from the table of contents).

A field trip from 2:45 to 5:30 p.m. August 7 included a demonstration of the Texas on-the-farm beef cattle performance testing program, herds of beef cattle at College Station, the meats laboratory and facilities for measuring quality of beef.

An evening session August 7 (7:00 p.m. to 9:00 p.m.) devoted to "Research and On-The-Farm Beef Cattle Performance Testing", indicated that organized performance testing programs for beef cattle were underway or getting started in at least 10 of the 13 states cooperating in S-10. (See page 10 for further details).

A field trip by bus (7:00 a.m. to 6:00 p.m.) was made to Texas Substation No. 23, McGregor, Texas where the group had an opportunity to see the breeding herds and inspect the facilities at that Station.

A dinner meeting held the evening of August 8 was addressed by Mr. J. R. Quinby on "The Production of Sorghum Hybrids". Some of the highlights of Mr. Quinby's discussion were as follows:

A method of producing hybrid sorghum seed using a cytoplasmic male sterile has been worked out. Seed was put into the hands of seed growers in the spring of 1956 and there will be enough seed to plant several million acres in 1957. Seven hybrids are in production. It is expected that grain production will increase about 30 percent from the use of hybrids. Cytoplasmic sterility works well in hybrid seed production. Such sterility results from the incompatibility of cytoplasm from milo and nuclear factors from kafir.<sup>1</sup>

1. Further discussion of this work can be found in Texas Agriculture Progress Vol. I, No. 1, pages 4 - 6.



MINUTES  
Business Meeting  
August 9, 1956

Chairman Bruce L. Warwick called the meeting to order at 1:30 p.m. August 6 and pointed out that the minutes of the 1955 meeting had been in the hands of the Technical Committee for some time. There were no comments or corrections and it was assumed that the minutes of the 1955 meeting were correct as published in the report of that meeting.

The group was invited to hold its 1957 annual meeting at the following places: Professor E. G. Godbey invited the group to Clemson, South Carolina; Dr. Warren Gifford invited the group to Fayetteville, Arkansas either in 1957 or 1958; Dr. Marvin Koger invited the group to Florida; and Mr. B. L. Southwell invited the group to Tifton, Georgia. In the discussion of the time and place of the next meeting it was brought out that it would be advisable to select a place that would fit in best with the main feature of the program. Comments indicated that the group favored a program that would feature reproduction as related to the beef cattle breeding program. It was moved by B. L. Southwell and seconded by Marvin Koger that the Executive Committee select the location for the next meeting at the place where the program could best be carried out, with the program and place of meeting to be determined at a later date by the Executive Committee. Motion carried. It was suggested that information on the meeting places and the program might be obtained prior to the Chicago meeting of the American Society of Animal Production in order that some action might be taken at that time if the members of the Executive Committee attended that meeting.

The matter of the decision of the Technical Committee in its 1955 meeting regarding a Regional publication on Brahman and crossbreeding work was discussed. It was moved by B. L. Southwell and seconded by Marvin Koger to instruct the Coordinator to look into the possibility of a Regional publication on Brahman and crossbred work and take action if possible before the next meeting, either by letter or by personal contact. Motion carried.

After some discussion of overlapping areas of research of beef cattle production and improvement, along with the development of action programs that came out of research, it was moved by E. G. Godbey and seconded by G. W. Litton that the Executive Committee study the problem of the boundaries of this project.

The Report of the Resolutions Committee.

Be It Resolved:

1. That we express our appreciation to the Animal Husbandry Staff of Texas A & M College for the excellent facilities and courtesy afforded this group for its annual meeting.
2. That Dr. Bruce L. Warwick and Dr. T. C. Cartwright receive our special thanks for conducting the field trip to Texas Substation No. 23, McGregor, Texas.
3. That we express our gratitude to Mr. R. L. Smith and Mr. B. L. Lisenbe of the Statistical Lab. for their contributions to the workshop on the use of punched cards.

4. That we as a group express our pleasure at the appointment of Dr. C. M. Kincaid as the Southern Regional Coordinator.
5. Since it has been announced that Dr. Bruce L. Warwick is resigning as a member of this Technical Committee be it further resolved that we express by standing, our appreciation for his many contributions and faithful service.
6. That we express our appreciation for the hospitality of Texas A & M College extended to this group.
7. That we express our appreciation to Mr. J. Roy Quinby for his interesting and enlightening talk to this group concerning the production of sorghum hybrids.

Respectfully submitted

W. C. Godley, Chairman  
E. U. Dillard  
E. H. Vernon

The report of the Resolutions Committee was approved.

Dr. W. W. Green was elected as a new Executive Committee member after the usual nomination and procedures.

Dr. W. E. Shaklee, SESD, representative on beef cattle projects, pointed out that a copy of the summary of Federal-Grant Research on Beef Cattle, recently prepared by SESD, was circulated. It stated that summaries for sheep and goats, swine, dairy cattle, poultry, and veterinary science are also available. A copy of any of the above summaries will be sent to research workers on request. It should be recognized that only a portion of the total State programs is included in the summaries. A substantial part of the research program of these stations is wholly supported by other than Federal-Grant funds.

SES-OD-1082, Manual of Procedures for Cooperative Regional Research, was revised and sent to all Technical Committee members during the year. Several changes were made necessary by recent legislation.

It was requested that SESD be kept up to date on the accomplishments of S-10 by being sent a copy of each bulletin or reprint published on the regional project. It was suggested that in the past project titles have been quite broad and general and identical to the regional project title. On the surface it would appear that several such projects constitute unnecessary duplication of research. As new and revised outlines are developed it would be desirable to assign titles that are more descriptive of the work that is to be done.

Dr. E. J. Warwick was called on and remarked as follows: "It is a real pleasure to meet with the S-10 group again and to observe the evidence of continued progress being made in the work of this project. I doubt that the few remarks I have will add appreciably to the meeting. There are, however, a few comments I should like to make.

"As all of you are aware, there are three regional beef cattle breeding



projects. Each of these projects will make the greatest progress and reap the greatest benefits from coordinated cooperative research approaches if the personnel of each project are as well informed as possible regarding the results from the other two projects. As a first step in improving this liaison we initiated a policy this year of making it possible for the coordinators in the other two regions to attend one other technical committee meeting each year. This year the S-10 and NC-1 coordinators attended the W-1 meeting held at Davis, California, in July. I believe it would also be desirable if a representative of each technical committee, either the chairman or some other designated member, would do the same thing each year. The W-1 group took a first step in this direction this year by making provision for the chairman, Dr. James E. Kidwell, of the Nevada Station, to attend the NC-1 meeting held at Madison, Wisconsin, last week.

"Since the organization of the three regional projects, the annual reports of each have been circulated to technical committeemen in other areas. I would like to urge all of you to study the reports from other regions. I am occasionally struck by the apparent lack of familiarity with what is going on in other areas.

"Last year at the S-10 Technical Committee meeting action was taken regarding the publication of several cooperative reports. I believe that the summarization of data from several stations, while not easy to accomplish from the mechanical standpoint, has much to commend it and that only through this approach can we fully justify the existence of regional projects. Thus, I would like to urge that these proposed publications be pushed in the immediate future. The data on crossing between the Brahman and British types of cattle available in this region seem to me to constitute one of the most, if not the most, striking example of heterosis to be found anywhere in the field of animal breeding. I believe it would be of real value to get this material together in a single publication.

"During the formative stages of the regional projects there was a natural tendency for each station to commit its entire facilities to the development of lines or strains of cattle. The result of this is that now when several lines have been developed to the point where testing them in crosses and in comparison with other lines is justified, facilities for testing are not available. This problem is presently more acute in the other two regions than in S-10 but is a problem which will soon be with this project as well. Looking forward to this problem the Mississippi Station and the Tennessee Station a few years ago initiate projects which involve testing of lines and strains developed at other stations. Neither of these attempts have been adequately financed as yet and we in the U. S. Department of Agriculture would appreciate the advice of you people as to whether or not increased Federal allocations for beef cattle breeding research, if and when they come, can best be used for this phase of the work or whether other aspects should take priority.

"I understand there has been some discussion in the Executive Committee meeting in regard to whether the application of research results to breeder operations through Extension programs should be considered to be at least partial research in nature. Questions of this kind are, of course, questions for the Technical Committee to decide. Personally, however, I would hate to see the research efforts of this group diluted by an undue emphasis on projects which are essentially extension in nature. This does not imply that we should not cooperate in such projects nor that we should not make full use of the research aspects of data collected in such programs. Ordinarily, however, I believe that these things will be of minor importance and that we should attempt to keep our principal efforts focused on things that are definitely research in nature."

Dr. R. E. Patterson, Administrative Adviser, pointed out that our breeding program needed to continue to grow and not to become static. He thought the relationship of record of performance testing programs which have grown out of research to present and future research programs should be considered carefully. It was his opinion that research workers should help and guide the program as it gets underway but not allow it to interfere with the basic and fundamental problems. He suggested that the Coordinator and Executive Committee go over the present project outline to see if it reflects the work being done and if it provides for new work that might need to be included in the program. He also suggested that consideration should be given to one or more regional publications that would reflect accomplishments on a regional basis.

He pointed out that the Technical Committeement from each State was appointed by the Director who, when a change was made, notified the Regional Adviser of such change.

Dr. Bruce L. Warwick expressed his appreciation for his term of office and thanked O. D. Butler, Harry Conkle, J. K. Riggs, and H. O. Hill for helping to make this meeting the success that it was. He also told the group that he had greatly enjoyed his work as Technical Committeeman over the past 8 years and indicated the major part of his time in the future would be spent in sheep breeding and investigations with Dr. Cartwright on the Technical Committee for S-10. In recognition of the excellent work Dr. Bruce L. Warwick had done in the development of the S-10 program, the group gave him a standing ovation.

The meeting adjourned at 3:00 p.m.



DATA ON CURRENT ALLOCATIONS, EXPENDITURES IN FISCAL 1956  
and INVENTORY VALUES ON JULY 1, 1956

STATE	Current Allocations Federal Funds				Expenditures Fiscal 1956				Inventory Values		
	Regional 9b3	APH For Coop. Work		State Funds Capital Outlays	Federal Funds		Total Cattle Adj. for use	Land and Facilities			
		Former 10b	Dwarfism		Operation 9b3	APH					
Alabama	10750	2400	--	10750	20253	10750	2200	64600	129188		
Arkansas	9000	3000	--	4900	38674	9000	2510	75891	244386		
Florida											
State Station	6000	--	2500	2850	29775	6000	2500	60340	206824		
Fed. Station Brooksville	--	--	--	--	6000	--	39000	55360	--		
Georgia	6000	--	--	2000	20000	6000	--	70172	19500		
Kentucky	9250	--	--	4000	--	8000	--	--	18000		
Louisiana											
State Station	6000	--	2000	8652	36935	6000	2000	121750	130724		
Fed. Station Jeanerette	--	--	--	--	20156	--	36765	118750	--		
Maryland	--	--	--	5444	28490	--	--	45532	187953		
Mississippi	4800	2200	--	--	21300	4800	2200	38662	62000		
North Carolina	9350	1500	--	10500	56500	9350	1500	45448	120514		
South Carolina	--	--	--	1960	9000	--	--	15660	32690		
Tennessee	9500	5200*	3000	10000	26800	9500	5160	269648	158300		
Texas	10000	5000	3200	3250	132247	10000	8190	118800	745039		
Virginia											
State Station	6000	3600	2500	691	17676	5400	6100	25250	228487		
Fed. Station Front Royal	--	--	--	--	40000	--	27890	--	--		
	86650	22900	13200	64997	503807	84800	136015	1125863	2283605		

\* Includes secretary and clerical help furnished Coordinator by Tennessee Station.





NUMBER OF CATTLE IN S-10 PROJECTS AND TEST FEEDING  
1955-56

State	Cattle Inventory July 1, 1956*				% Used on Project	Cattle Fed After Weaning Under Test Conditions 1955 - 56			
	Cows 2 yrs & over	Yearling heifers	Calves under 1 yr	Bulls over 1 yr	Steers 1 yr & over	Ind.	Group	Ind.	Group
Alabama	149	30	109	16	19	-	77	-	-
Kansas	241	51	160	20 $\frac{1}{4}$	17	48	-	3	-
Florida State Station	279	46	160	18	24	-	-	-	22
Federal Station Brooksville	198	58	108	23	53	-	77	-	-
Georgia	524	139	449	17	-	-	47	-	-
Kentucky						30			
Louisiana State Station	361	79	188	11	-	-	-	-	64
Federal Station Jeanerette	241	61	148	25	-	20	-	-	33
Wyland**	71	13	55	2	8	-	-	11	10
Mississippi	380	50	242	10	20	-	-	-	20
North Carolina	282	75	204	20	52	-	20	-	-
South Carolina	59	-	52	1	52	-	-	-	-
Tennessee	1066	334	903	100	187	-	33	-	-
Texas	412	115	241	36	-	-	433	-	124
Virginia State Station	118	-	-	6	-	-	-	-	-
Federal Station Front Royal	470	115	214	27	-	46	-	-	39
TOTAL	4851	1166	3233	332	432	144	687	14	312

21 585

Includes all cattle of each station, whether owned by state, Bureau of Animal Industry, or cooperating breeders.

\* Does not include cattle in an outside cooperating herd.





PUNCHED CARD WORKSHOP  
S-10 TECHNICAL COMMITTEE MEETING, COLLEGE STATION, TEXAS

August 6, 1956

9:00-9:15  
M.S.C.

Workshop Introduction  
T. C. Cartwright

9:15-10:00  
M.S.C.

Details of the Punched Card.  
R. L. Smith

10:00-10:10

Break

10:10-12:00  
M.S.C.

The McGregor Station System of Punched Cards for keeping herd records. T. C. Cartwright, B. L. Lisenbe and Bruce L. Warwick

12:00-1:00

Lunch

1:00-3:00 or  
M.S.C. 3:30

Examples of Punched Card Uses Explained in morning program. T.C. Cartwright, B.L. Lisenbe, B.L. Warwick

20 to 30 min.

Break and travel to Statistical Lab., System Admin. Bldg.

3:30 or 4:00-  
5:00  
Stat. Lab.

Tour of Statistical Lab - General Explanation of Each Machine  
R. L. Smith and Bradford L. Lisenbe

5:00-7:00

Free Time.

7:00-9:00  
Stat. Lab.

Demonstration of Machines Using Participant's Cards from Afternoon Program  
R.L. Smith, B. L. Lisenbe, T. C. Cartwright

August 7, 1956

8:00-8:30  
M.S.C.

Punched Card Forms Used in the Gain Test at McGregor  
T. C. Cartwright

8:30-9:00  
M.S.C.

Lay-out of Meats Laboratory Data Sheet  
O. D. Butler

9:00-9:30  
M.S.C.

Using Marked Sensed Punched Cards in the Collection and Analysis of Experimental Data. R. R. Shrode

9:30-10:00  
M.S.C.

Further Uses of Punched Card Machines and a Look into the Future. R. L. Smith

10:00-10:10

Break

10:10-12:00  
M. S. C.

Speaker's time and questions and discussion from the audience will not be limited during this morning session. Appropriate problems and questions should be brought out at this time. All of the discussion leaders will be present.

## CANCER EYE INVESTIGATIONS WITH BEEF CATTLE

David E. Anderson

Cancer eye is a term commonly applied to squamous carcinoma of the mucous membrane of the eye and skin of the lids in cattle. It occurs on this localized area at a relatively high frequency. This offers abundant material for experimental study of a neoplastic process in a large mammal. Potential clues concerning cancer eye in humans might be had from study of the bovine type. Cancer eye in the bovine is of economic significance because it can reduce productivity, and can result in condemnation of the carcass or part of the carcass at slaughter.

Age-incidence of cancer eye, the relationship between cancer eye and amount of pigmentation on the skin of the lids, inheritance of lid pigmentation, and inheritance of cancer susceptibility have been studied.

RESULTSRelationship between cancer eye and eyelid pigmentation

A definite correlation ( $P < .01$ ) was found between lid lesions and lid pigmentation. Animals with lid lesions and no lid pigmentation were more numerous than expected if lesions and pigmentation occur independently. Partially pigmented lids had correspondingly fewer lesions, while no lesions were ever observed on completely pigmented lids. There was only a slight indication of any association between lesions at other sites on the eye and lid pigmentation ( $.20 < P < .40$ ).

Heritability of lid pigmentation

Heritability estimates of lid pigmentation ranged from .41 to .50. Mass selection for an increased amount of lid pigmentation should be effective. This would be expected to reduce the incidence of lid lesions, but not have much effect on the frequency of lesions on the cornea, nictitans and caruncle.

Age-Incidence

Knowledge of age-incidence is necessary for interpretation of the presence or absence and inheritance of susceptibility of cancer eye. Age is of further concern because it can be used as a basis for a score of individual susceptibility.

Age-incidence tends to increase with age, but is variable for different ages. Age distributions have been narrow because of a small number of affected animals. A score which accurately considers age should increase the sensitivity of the measure of susceptibility over an "all-or-none" scoring scheme. Scores based on narrow age distribution have increased the sensitivity by a factor of only 1.2. There is need, therefore, for age-distributions to involve more animals.

Heritability of susceptibility

The heritability of susceptibility was estimated for two herds. Susceptibility in each was measured by scores. Estimates of .29 and .27 were obtained for the herds of similar age-composition. Additional estimates of .41, .30, and .36 were obtained from one of the herds for a portion of the population



which ranged in age from 5 to 15 years. These estimates should be confirmed with a larger number of animals from other herds and areas.

Information on the comparative incidence of cancer eye in different areas might shed light on a hereditary-environmental interaction in cancer eye. It can also serve to indicate the importance of sunlight, dust, etc. as initiating factors in the disease.

Additional information on age, comparative incidence and susceptibility of cancer eye would be facilitated by collaboration of private herds and/or institutional herds by (1) furnishing data showing the numbers treated or sold because of cancer eye, and/or (2) by having present herds observed directly for cancer eye.

#### RESEARCH AND ON-THE-FARM BEEF CATTLE PERFORMANCE TESTING

C. M. Kincaid, Leader

In introducing the discussion of this subject, it was pointed out that performance testing of beef cattle was spreading rapidly through organizations of breeders and also by individual breeders starting independent programs. Extension and/or research personnel were providing the leadership in most cases. Since this development was an application of research findings, it was suggested that people in beef cattle breeding research keep in close touch with programs in their areas and help put them on a sound basis. A brief report by someone in attendance from each state indicated group programs underway or starting in Alabama, Arkansas, Florida, Georgia, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Texas and Virginia.

The information shown in Table 1 was presented by the leader of this discussion to illustrate the relative influence of ability to gain and actual gain achieved to weaning on subsequent gain in the feed lot.

For these computations, the assumption (other than those shown in the footnotes of Table 1) were as follows:

1. Calves were weaned at 210 days of age.
2. Growth rate under optimum conditions was essentially linear from birth to 18 months of age.
3. Where growth was retarded prior to weaning, the retarded calf would recover in the feeding period two-thirds of what he was behind at weaning.

It was suggested that lifetime gain was a better measure of real ability to gain than either pre-weaning or post-weaning gain by itself.

#### PERFORMANCE TESTING IN BEEF CATTLE FROM THE NATIONAL STANDPOINT

E. J. Warwick

During the past two or three years, and particularly during the past year, there has been a very marked increase in interest in the development of performance testing programs. I am not sure that anyone is completely up-to-date on these developments for the entire country. Before coming to this meeting, I called Mr. Charles E. Bell, Federal Extension Service, and he informed me that, according to his records, at least 18 states now have active

extension programs in the field of beef cattle performance testing and that of these, six have breeder organizations actively sponsoring and cooperating in the work. I am sure that these figures are already out-of-date since I have already found that one or two Southern states, not on Mr. Bell's list, have either started or are in the process of organizing programs.

This rapid increase of interest in and development of organized programs on performance testing is in my opinion a real tribute to the research work which has been and is being done in the three regional beef cattle breeding research projects. I know that we are all interested in seeing the application of our research results made in a sound fashion and at the same time in getting just as rapid an application as is possible of those results based upon adequate evidence.

It is my opinion that we, as research workers, have a responsibility to counsel with Extension workers and breeder groups on the application of our research and to guide them into the soundest channels possible. I hope that we can accomplish this and still not lessen our efforts in the research field itself.

#### HOW TO ESTABLISH BROAD USE OF PERFORMANCE TESTS AND PRODUCTION RECORDS

L. A. Maddox, Jr.  
Extension Animal Husbandman  
Texas Agricultural Extension Service

The plan submitted here tonight is the one now in operation in this state and in some of the surrounding states. It is the result of many hours of planning by cattlemen, Extension personnel, and Research workers. This plan, in many cases, operates similar to the Dairy Herd Improvement Program with the idea in mind that the cattlemen through the local, state and national associations will be able to take over the program in a few years.

This plan as presented here outlines responsibilities of the local supervisor and the local, state and national associations with the help that will be given in the initial stages at the county and state level by the Extension Service and the Experiment Station.

A beef cattle improvement supervisor or a county agricultural agent who is conducting a demonstration should visit the herd owner before the first weighing and grading of calves. During this visit, the entire program should be explained to the farmer or rancher, including his responsibility in continuously furnishing records on his cattle and the benefit he and other association members would receive from their use. A visit prior to the day the cattle are worked is advisable in starting a new cooperator or demonstrator.

During this visit, the supervisor or agent and the herd owner will work out where, when and how the calves will be identified, weighed and graded. Information furnished by the rancher (number, dam, sire, date of birth and age in days) should be recorded at this time. If this is not possible, it can be written down immediately after the weighing and grading.



The supervisor must determine the production of each cow or groups of cows in the herd, and keep complete records so the herd owner will be guided in the selection of breeding cattle for more profitable beef production. He also must keep up-to-date identification records on all animals in the herd, so the owner can use the production records in a progressive breeding program.

Information on ranch practices, range management and supplemental feeding should be analyzed because it relates to beef production and profit of each rancher's operation.

The supervisor's records and reports also help local, state and national associations, the Extension Service and the Experiment Station to use the information given as the basis for developing more effective production tests, new methods of applying the information and for locating animals or lines of breeding that transmit high production and beef conformation. The supervisor should fill out completely the various blank forms used in the association work. He should understand thoroughly the exact information wanted in each item and how to record it properly.

Local associations usually organize on the basis of one or more counties. They employ supervisors as needed to conduct the testing work in all herds enrolled. They are responsible for furnishing equipment needed by the supervision, and for collecting the money to pay his salary and expenses. Testing work in beef herds is conducted in line with the rules set up by the Texas Beef Cattle Improvement Association.

County agricultural agents can supervise performance-testing work for such associations while they are in the organizational or demonstration stage. However, associations should recognize that these agents are assigned a complete and well-balanced educational program in all phases of agriculture and cannot devote a disproportionate share of their time to a ~~single~~ enterprise.

When an association has grown to such size that an undue amount of an agent's time is required for supervisory work, the association should employ a competent supervisor. In the initial stages, the association should plan to employ a supervisor as soon as possible.

The records are used by the herd owner in culling his herd, selecting heifer calves for herd replacement, selecting young bull calves as herd bull prospects and proving herd bulls. These records can be used as evidence of the productivity of a herd for establishing better markets because the tests are conducted by an impartial person, the association supervisor.

The local association's responsibility follows:

1. Employ a local supervisor as soon as possible.
2. Obtain records of performance and production of beef cattle.
3. See that tests are made and reported accurately.
4. Submit copies of records to the state superintendent's office.

Beef cattle breeders who desire recognition in the American Beef Cattle Performance Registry Association must conduct their tests according to the rules and regulations of the association and forward them to the state superintendent.





The primary purpose of a beef cattle improvement association is to afford the members an economical method of obtaining information they can use in improving the producing efficiency of their herds and improve the grade or beef conformation of the young beef animals that are sold. The records of identification and production along with grade enable the herd owner to cull the least profitable cows and bulls and to select the most suitable animals for improving the inherent producing ability of the herd.

The Texas Beef Cattle Improvement Association was organized by beef cattlemen interested in an effective, uniform and well-organized state program. This association is financed by small annual dues and fees on calves tested.

Some of the responsibilities of the state association are: encouraging and assisting in organizing local associations; setting up geographic limits of operation; assuring cooperation with all beef cattle breeders within the area of the local association; and cooperating with the Experiment Station and Extension Service to see that the records are analyzed and the information obtained is made available to members of the association and to the beef cattle industry.

The state association, cooperating with the Texas Agricultural Extension Service and the Texas Agricultural Experiment Station, renders a valuable service to the beef cattle improvement program in Texas in the following ways:

1. Establishes uniform methods and supervision for obtaining and reporting records.
2. Furnishes personnel necessary for receiving, processing and filing records of performance and production.
3. Forwards to the national association records necessary for issuing performance and production certificates.
4. Makes records of performance and production available to Extension Service and Experiment Station personnel as requested.

The Texas Agricultural Extension Service, in carrying out its educational responsibilities of applying research information in a practical program, will assist the program as follows:

1. Improve present and develop new demonstration programs by which performance and production tests can be used more effectively on farms and ranches.
2. Improve present and develop new record forms for use on farms and ranches.
3. Ask county agricultural agents to act as supervisors during demonstration phases as long as this work does not require a disproportionate share of time from their overall agricultural responsibilities.
4. Emphasize the educational program and acquaint farmers and ranchers with the value of performance and production tests and records in more efficient beef production.
5. Allow an Extension animal husbandman to serve as state superintendent of beef cattle testing, if requested.

The Extension program is designed to work with and through local, state and national associations for more efficient beef production by using progeny and performance tests. The Extension responsibility is educational as to the need for progeny tests and production records, their practical application, and results that can be obtained. The demonstration method should be used whenever possible to further the educational responsibilities.

When conducting these educational demonstrations, the county agricultural agent is considered an official supervisor, and the records of performance and production gathered by him will be accepted by the state and national associations

The Texas Agricultural Experiment Station will continue to provide research whereby more practical methods of testing and analysis can be developed. To render further service as a research organization, the Texas Agricultural Experiment Station will:

1. Make available new information of potential value to improve further the methods of evaluating beef cattle.
2. Provide material, equipment and personnel necessary for study and analysis of data.
3. Publish jointly with the Extension Service the results and findings.

The American Beef Cattle Performance Registry Association was established to encourage measuring and keeping records of performance and production of beef cattle and to encourage the use of these records as an aid in selecting more productive breeding cattle. Records properly emphasizing quality, beef conformation and production give beef cattle producers an opportunity to have a sound, profitable breeding program.

The national association will obtain beef cattle production records from all states. These records will be gathered under uniform rules and regulations as prescribed by the association. Records obtained in this manner will permit the exchange of breeding cattle between all sections of the country with confidence.

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Table 1. Expected Influence of Inherent Gainability and Weaning Weight on the Performance of Steers Full Fed From Weaning To A Weight of 1000 Pounds.

Inherent gainability (lbs per day)	1.50	1.75	1.75	2.00	2.00	2.00	2.25	2.25	2.25	2.25
Weaning weight (lbs)	375	375	435	435	490	435	375	435	490	540
Final market weight (lbs)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Expected time on full feed from weaning to market weight (days)	417	335	323	275	265	255	228	219	211	204
Expected feed required in drylot										
Ear corn (bu)	70	60	58	53	51	49	46	45	43	42
Silage (tons)	2.45	2.10	2.03	1.84	1.78	1.71	1.62	1.56	1.50	1.46
Hay (tons)	.70	.60	.58	.53	.51	.49	.46	.45	.43	.42
Oil meal (tons)	.23	.20	.19	.18	.17	.16	.16	.15	.14	.14
Total T.D.N. (lbs) <sup>1</sup>	5838	5025	4845	4400	4240	4080	3876	3723	3587	3468
Average daily gain										
Birth to weaning	1.50	1.50	1.75	1.50	1.75	2.00	1.50	1.75	2.00	2.25
Weaning to market weight	1.50	1.87	1.75	2.27	2.13	2.00	2.74	2.58	2.42	2.25
T.D.N. per 100 lbs. gain	9.34	8.04	8.58	7.04	7.50	8.00	6.20	6.59	7.03	7.53
Feed cost per 100 lbs. gain	24.84	21.38	22.82	18.72	19.95	21.28	16.49	17.55	18.69	20.05
Value at weaning <sup>2</sup>	75.00	75.00	87.00	75.00	87.00	98.00	75.00	87.00	98.00	108.00
Feed cost after weaning <sup>3</sup>	155.29	133.66	128.88	177.04	112.78	108.53	103.10	99.03	95.41	92.25
Margin above cost of feeder calf and feed <sup>4</sup>	-10.29	11.34	4.12	27.96	20.22	13.47	41.90	33.97	26.59	19.75

1. Estimated as 50 pounds of T.D.N. per 100 pounds of feed.

2. Feeder calves valued at 20¢ per pound.

3. Feed costs based on ear corn at 1.30 per bu.; silage at \$.10. per ton; hay at \$.30. per ton; and oil meal at \$.80. per ton.

4. Finished cattle valued at 22¢ per pound or \$.220. per head at 1000 pounds liveweight.





## ALABAMA STATION

SUBMITTED BY W. M. WARREN AND G. B. MEADOWS

Approximately 975 acres of land were purchased by The Alabama Agricultural Experiment Station in 1950 for the purpose of developing a Beef Cattle Breeding Research Unit. Most of the area was abandoned crop land that had been idle for several years. The entire area has been fenced and about 450 acres have been reclaimed and seeded to grazing crops. The clearing operation is proceeding on schedule and an additional 70 acres will be seeded to alfalfa this fall. The acquisition of a war surplus bulldozer has facilitated the clearing problem: hand reclamation will be continued until the unit is operating at full capacity.

The present inventory of cattle shows that there are 205 breeding animals and replacement yearling heifers. The present calf crop numbers about 125 head. The breeds represented are the Angus, Hereford and Shorthorn. It is anticipated that the number will be increased as more land is cleared and seeded to grazing crops.

The major project is entitled, "The improvement of performance of beef cattle through mass selection". The objectives are:

1. To determine the effectiveness of mass selection for total performance in beef cattle.
2. To develop criteria for evaluating and selecting breeding animals.

The cows are hand-mated during the early part of the breeding season and pasture breeding is resorted to during the last six weeks. Cows are bred to calve during the late fall and winter months. Cow weights at calving and birth weights are taken. All steer and heifer calves are dehorned.

All calves are weaned at a standard age, 250 days  $\pm$  3, weighed and scored by a committee. The bulls and heifers are put on a regular 154 day gain evaluation test. After completing the test, all animals are scored again. Conformation score, weight per day of age and average daily gain on test receive equal weight in selecting breeding animals.

The steer calves are wintered and used in grazing trials or feeding experiments. The 1954-55 steer crop is on a feeding test to evaluate the importance of environmental factors on summer gains.

In the past, replacement heifers have been bred to calve as two-year-olds. In 1953-54 seventeen Shorthorn heifers calved as twos. Of this number only 7 calved in 1954-55. Thirteen of the seventeen are nursing calves this year. In 1954-55 twenty Hereford heifers calved as twos and only seven have calves this year. On the basis of these two years results, the practice of calving as two-year-olds has been discontinued.

The heifers retained as replacements from the 1954-55 and 1955-56 gain evaluation tests will be used in the cross breeding experiment discussed at previous meetings. Enough older cows will be included to increase the number up to the requirements of the design. The older cows will be selected on the basis of the performance of their previous calves.

-2-

A bull of each of the three breeds was retained from the 1955-56 performance test to be used in the cross breeding study.

The Station has operated a gain evaluation test of young bulls as a service to Alabama breeders for the past five years. In previous years the bulls were group fed in dry lot, and the 1955-56 test differed in only one major respect. The bulls were divided into horned and polled groups and fed ad lib. on pasture. Some of the results of this years test follow:

Average Daily Gain and Feed Required: 1955-56 Test Bulls

Breed	Number	ADG	Range in ADG	Feed Required per Cwt. Gained
Angus	23	2.12	1. 62-2.61	1045# of a mixed ration consisting of Alfalfa and grass hay, snapped corn, C.S.M., cottonseed hulls, and molasses.
Charbray	2	2.66	2. 63-2.69	
Santa Gertrudis	2	2.92	2. 82-3.02	
Hereford	26	2.22	1. 56-3.02	
Polled Hereford	16	2.01	1. 40-2.86	
Polled Shorthorn	5	2.53	2. 37-2.69	
Shorthorn	3	2.35	2. 10-2.52	
	<u>77</u>	<u>2.23</u>	<u>1. 40-3.02</u>	

At the completion of the test, a breeder may elect to sell his animals at public auction. Sixty-seven animals were sold for an average of \$311.00. Twenty Angus averaged \$250.00, 24 Herefords averaged \$302.00, 15 Polled Herefords \$356.00, 5 Polled Shorthorns \$373.00, 2 Shorthorns \$265.00 and one Santa Gertrudis \$800.00

There are many factors that influence the sale price of a bull, but this was the first year that buyers consistently paid more for the better performing individuals. Within breed correlations of sale price with total score were highly significant. The range in prices for the 10 best gaining bulls as compared to the below average group indicates a genuine demand for top gaining bulls.

Sale Prices of Bulls at Auction, 1955-56 Field Day

Average	No. of Animals	ADG	Ave. Price Paid	Range
All bulls	67	2.18	\$311	\$155-\$800
All above ave. daily gain	32	2.50	\$372	\$200-\$800
All below ave. daily gain	35	1.88	\$305	\$165-\$400
All qualifying for ABCPRA	10	2.76	\$469	\$400-\$800
All not qualifying for ABCPRA	57	2.08	\$283	\$165-\$500



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This was the first year the Station had produced bulls sufficiently good in total performance to warrant offering any number for sale at auction. The soundness of the Station selection program is indicated by the fact that the two top Angus bulls and 7 out of the top 10 Angus were produced here. Also, seven of the first 10 Herefords were Station bulls.

## Station vs Breeder Bulls

	No.	ADG	W/D of Age	Conf. Score	Total Score	Ave. Price Paid
Angus (Station)	10	2.29	1.99	88.7	76.5	\$315.00
Angus (Breeder)	13	1.99	1.90	83.5	70.7	\$207.00
Hereford (Station)	14	2.36	1.93	86.7	76.0	\$335.00
Hereford (Breeder)	12	2.06	1.84	78.5	69.0	\$264.00

The Station bulls were superior to the breeder animals in all component factors used in evaluating total performance, and the advantage carried over into buyer preference.

At the breeders insistance the bull testing will be continued. In addition on-the-farm testing was initiated this spring with two herds. Interest in this is spreading rapidly and should develop into a major program.

The initial matings in the crossbreeding study will be made this winter and the within breed selection study will be continued.

Observation indicates that age of dam does not effect weaning weights alike for all breeds. Therefore, a study of pre-natal, pre-weaning and post-weaning rates of growth and the relationship between them will be made of the three British breeds.

## ARKANSAS STATION

Submitted by C. J. Brown

Beef cattle breeding research from the Arkansas Station that contributes to the Southern Regional Breeding Project is conducted under a project entitled "Record of Performance Tests for Beef Cattle". These studies are conducted with the purebred Hereford, Angus and Shorthorn herds maintained at Fayetteville and the purebred Angus herd maintained at Batesville. The work in progress follows four general lines of investigation. These might be listed as the visual appraisal of cattle, evaluation of cow performance, evaluation of young prospective herd sires, and studies on growth and development.

Studies on the visual appraisal of cattle were continued. Data were recorded on 517 cattle by four judges. Under this phase of the project the manuscript for the regional publication "Relationships Between Type Scores and Live Animal Measurements of Beef Cattle" was submitted to the Journal of Animal Science and will appear in the August issue.

Studies on the evaluation of cow production were continued. Weights and grades of calves at weaning were recorded on all calves. Milk production records on 21 first calf heifers were obtained along with data on calf growth and behavior. Heritability of weight and certain body dimensions at weaning (240 days) were estimated from data accumulated between 1940 and 1953. These data were corrected for age at weaning, sex of calf, year and month of birth and age of dam. Average weights related to these factors are shown in Table 1. Estimates of heritability obtained from components of variance related to sires, and dams and estimates obtained from regression of offspring on dam are shown in Table 2. Phenotypic and genetic correlations between weight and the body measurements are shown in Table 3. These estimates would seem to add support to the studies of other workers who have indicated that the maternal influence may seriously bias those estimates made from data which contain variance from this source.

Evaluation of young prospective herd sires has been continued with the individual feeding of 45 young bulls. A report on the relationship between the performance of these bulls and the price they sold for at auction in sales conducted in 1952 through 1955 was given at the American Society of Animal Production meetings. Also a similar article of more popular nature appeared in the July issue of the Polled Hereford World. These data indicated that buyers in general made their purchases on the basis of visual appraisals but that they were willing to pay more for bulls having superior records in feed lot gain, feed efficiency or 120 day weight.

Further data on growth and development of beef cattle were accumulated. Weights taken monthly and body measurements were taken at 4 month intervals on all cattle under 2 years of age. For cattle older than two years these measurements were taken in January and July. A summary of the growth data that were accumulated between 1940 and 1953 have been published in Arkansas Experiment Station Bulletins 570 and 571 for the Hereford and Angus Breeds respectively. These publications give the average weight and measurements of cattle from birth to ten years of age. The percentage of mature size attained at various ages was also calculated. Normal variation for weight and each of the measurements was described at 1, 6, 12, 18 and 24 months and 5 years for females and at 1, 6, and 12 months of age for males. Correlations were used to indicate the relationships among weight and the measurements studied at 1, 6, 12, 18 and 24 months.



Table 1. AVERAGE 240 DAY WEIGHT ACCORDING TO BREED AND SEX

<u>Hereford</u>			<u>Angus</u>		
No.	Wt.	Dev. from heifers	No.	Wt.	Dev. from heifers
Heifers	134	403	105	433	---
Steers	62	428	40	456	23
Bulls	59	510	67	500	67

## AVERAGE WEIGHT ACCORDING TO YEAR OF BIRTH

<u>Hereford</u>			<u>Angus</u>	
Year	No.	Wt.	No.	Wt.
40	4	358	2	394
41	6	383	1	403
42	15	350	2	384
43	13	381	5	343
44	18	384	6	450
45	19	359	3	437
46	19	414	3	418
47	16	444	3	529
48	13	467	1	444
49	17	477	24	483
50	21	453	36	498
51	25	415	38	453
52	29	369	37	376
53	40	372	51	402

## AVERAGE WEIGHT ACCORDING TO MONTH OF BIRTH

<u>Hereford</u>			<u>Angus</u>	
Month	No.	Wt.	No.	Wt.
July	4	312	5	503
August	7	390	5	470
September	60	379	38	420
October	32	387	29	415
November	26	373	13	456
December	16	395	16	407
January	15	371	14	418
February	15	428	13	459
March	41	462	33	432
April	20	439	20	416
May	13	360	16	447
June	6	407	11	445

## AGE OF DAM

Age of Dam	2	3	4	5	6	7	8	9	10
Hereford (No)	67	47	44	29	22	15	11	9	13
(Wt)	340	347	375	388	390	399	426	390	410
Angus (No)	26	32	27	27	23	26	17	9	25
(Wt)	342	391	396	399	408	385	408	436	394

Table 2. HERITABILITY OF WEIGHT AND BODY MEASUREMENTS AT WEANING (240 days)

d/f	Hereford				Angus	
	Paternal half-sib	Maternal half-sib	Reg. off. on dam $\frac{1}{2}$ /	Reg. off. on dam $\frac{2}{2}$ /	Paternal half-sib	Maternal half-sib
	6	152	154	99	7	168
Weight	.26	.52	.04	.55	.11	1.10
Wither height	.29	-.30	-.14	-.10	.38	.63
Hip height	.21	-.83	.48	.40	.22	.64
Chest depth	.33	-.65	.36	.24	.17	7.39
Flank depth	.15	.06	-.05	-.01	.40	.40
Shoulder width	.12	-.37	-.01	.01	.78	-.04
Hip width	.15	-.20	-.02	-.01	.32	-.04
Body length	.10	.64	.37	.35	.00	.49
Heart girth	.44	.63	.03	.31	.06	-1.03

1/ Dams repeated with each offspring

2/ Offspring of each dam averaged within sire



Table 3.

CORRELATIONS BETWEEN WEIGHT AND BODY MEASUREMENTS OF HERLFORD  
CALVES AT WEANING,  $d/f = 99$

Measurement	Phenotypic	Genetic
Wither height	.49	.12
Hip height	.50	.30
Chest depth	.76	.00
Flank depth	.44	.00
Shoulder width	.91	.43
Hip width	.58	.35
Body length	.67	.27
Heart girth	.71	.13

FLORIDA STATION REPORT - S-10 MEETING  
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1. Project No. 390: Breeding Beef Cattle for Adaptation to Florida.  
(Contributing to S-10) Range Cattle Station, Ona, Florida

Leaders: W. G. Kirk and F. M. Peacock

This project has been underway since 1949. Cattle of varying proportions of Brahman and European breeding have been studied to determine their value for foundation animals and commercial beef production. Weanling calf production and feed-lot performance of steers have been the criteria for evaluating performance. In recent years, steers from this experiment have been used in meats studies dealing with factors affecting carcass grade and tenderness.

A summary of production by dams of different breeding to 1953 is shown in the following table:

The Effect of Breeding of Dam on Weaning Weight of  
Calves Adjusted for Years, Sires and  
Time, Corrected for Age of Calf and Sex

Breeding of Dam	Number of Calves	Adjusted Mean	Deviation from the Mean
English	221	367.9	-3.8
1/32 to 15/32 Brahman	114	381.7	+10.0
1/2 Brahman	267	394.6	+23.0
17/32 to 31/32 Brahman	58	377.0	+5.3
"Florida Native"	13	337.1	-35.0

Steer calves of varying proportions of Brahman and Shorthorn breeding have been fed in dry lot and slaughtered from 13 to 16 months of age. All groups have been successfully finished to good and choice grades. Carcass grades have tended to be slightly lower and efficiency of feed utilization slightly higher in animals with higher levels of Brahman breeding.

Publications:

1. Peacock, F. M. 1953. Factors affecting the weaning weight of range calves. Master Thesis
2. Peacock, F. M., W. G. Kirk and M. Koger. 1953. Effect of breeding of dam on weaning weight of range calves. J. Animal Sci. 12: 896.
3. Peacock, F. M., W. G. Kirk and M. Koger. Factors affecting the weaning weight of range calves. Florida Agricultural Experiment Station Technical Bulletin. In press.



II. Project No. 629. Selection of Cattle for Beef Production in Southeastern United States. (In cooperation with USDA. Contributing to S-10) West Central Florida Experiment Station, Brooksville, Florida.

Leaders: M. Koger, A. C. Warnick, W. G. Kirk, C. M. Kincaid and M.W. Hazen

This project was initiated in 1952. The performance of five breeds of cattle are being compared under conditions prevailing at the West Central Florida Experiment Station, Brooksville. The breeds included are Angus, Brahman, Brangus Hereford and Santa Gertrudis. Foundation herds of 25 to 45 cows had been established for all breeds. Plans have been completed for using bulls from three of these foundation herds in studying breeding systems for commercial beef production and to determine whether specific combining ability between strains can be improved. The first bulls will be put in service in 1957.

The weaning data from the 1955 calf crop is shown in the accompanying table. The results indicate the principal difficulties that have been encountered in the various breed groups to date. Weanling weights from the British breeds have been substandard while reproduction efficiency is substandard in the Crossbred and Brahman groups. These results are in general agreement with results observed in private operations in southern Florida. How much of the difficulty is due to the inherent characteristics of the cattle, how much to faulty management and how much to inadequate nutrition remains to be determined. The post-weaning growth of the cattle to date has been about what one would expect in view of the mature size of the breeds involved.

Publications:

1. Warnick, A. C., W. C. Burns, M. Koger and M. W. Hazen. Puberty in English, Brahman and Crossbred breeds of beef heifers. Southern Agricultural Workers Conference. February, 1956.

III. Project No. 752: Dwarfism in Beef Cattle. (Contributing to S-10) Main Station, Gainesville, Florida.

Leaders: M. Koger, A. C. Warnick and J. F. Hentges.

This project was begun on a preliminary basis in 1954 and expanded to the formal project in 1955. The object of the experiment is to describe and characterize the various types of dwarfs found in beef cattle of various breeds in Florida and to determine the genetic relationship between the more prevalent types.

Dwarfs of various descriptions have been slaughtered for anatomical and histological studies. The more vigorous animals have been retained in order to obtain test matings between the various types of dwarfs. Also dwarf males have been mated to a few carrier females of known genotype. Additional carrier females are being sired by mating dwarf bulls artificially to normal females. The females from these matings will be retained for use in test matings to dwarf males. Experience to date would indicate that the use of carrier females on test matings will be necessary in the more lethal forms of dwarfism. Dwarf males will be used exclusively and mated artificially when necessary. The most important results obtained to date are summarized in the following tables:

# EXISTING ABNORMALITIES OF VARIOUS DWARFS STUDIED

Type of Dwarf	Number Examined	Per Cent of Animals Showing These Abnormalities					
		Hydro-caphalus	Beaded Vertebrae	Shortened Long Bones	Shortened Maxilla & Nasal Bones	Long Nasal Bones	Abnormal Thyroids
Snorter Hereford	17	100	100	100	100	0	0
Snorter Angus	2	100	100	100	50	50	0
Long-headed Hereford	1	100	0	0	0	100	0
Long-headed (Ant-eater) Angus	4	75	75	0	0	100	0
Long-headed Shorthorn	1	0	0	0	0	100	100
Long-headed Hereford X Jersey	3	100	0	0	0	100	0
Long-headed Shorthorn X Brahman	1	100	100	0	0	100	0
Midget Brahman	1	100	0	0	0	0	0

## Dwarf X Dwarf Mating and Offspring Produced

Sire	Dam	Phenotype of Offspring
Snorter Hereford	Snorter Angus	Snorter
Long-headed Hereford	Snorter Angus	Apparently Normal
Long-headed Hereford	Long-headed Angus	Apparently Normal
Midget Brahman	Midget Brahman	Midget
Midget Brahman	Long-headed Angus	Midget

## Publications

1. Koger, M., J. C. Dollahon, A. C. Warnick, W. G. Kott, J. F. Hentges A. Z. Palmer. 1955. Forms of dwarfism in English and Brahman breeds of beef cattle. J. Animal Sci. 14: 1186-1187.



Summary of Weaning Data, 1955 Calves  
Brooksville, Florida

Breed Composition and Sire of Calves	No. Cows Bred	No. of calves		Weaning % (2)	180 day weight Actual Adj.(3)	Weaning Data			Prod. per Cow lbs. Sept. 1955
		Born	Weaned			Avg. Weaning Ages Days	Wgt. Type lbs. Scores	Cond. Score	
Angus	14	12	12	85.7	283	323	343 10.2	7.5	294 96.2
Brahman	27	19	19	70.4	307	330	321 8.7	7.8	226 58.6
Brangus	44	33	29	65.9	319	358	331 8.3	7.6	218 46.3
Hereford	34	28	27	79.4	252	297	264 9.2	6.7	210 75.8
Santa Gertrudis	28	20	18	64.0	367	419	396 8.8	8.6	253 41.2
SG X RP (1)	24	21	21	87.5	348	391	369 8.0	7.5	323 40.7
TOTAL HERD (4)	171	133	126	73.7	311	351	331 8.7	7.5	56.2

(1) From Red Poll and Red Poll cross cows

(2) Number of calves weaned/ Number of cows bred

(3) Adjusted to male sex and mature age dam. Female plus 20 lbs.-- male. Correction factors for age of dam were 60, 40, 20, 20 and 40 lbs. for 3, 4, 5, 10 and 11 year old cows respectively.

(4) Does not include 6 calves from dwarf carrier cows, nor four crossbred calves resulting from accidental matings.





## GEORGIA STATION

SUBMITTED BY E. L. SOUTHWELL, JULY 1956

Beef cattle breeding research under the Southern Regional Breeding Project in Georgia is conducted at Tifton and Reidsville. The work at Reidsville is supervised by Experiment Station personnel whereas the Georgia State Prison furnishes most of the animals and facilities.

The purpose of studies at Tifton is to study the effects of selection for three single traits (weaned weight, rate of feedlot gain, and type or conformation score) as compared to an index selection for all three traits. Four breeding groups of approximately 20 Polled Hereford females each are used in this study. The units are single sire units with sires being changed each season. Weaned weights, rate of feedlot gain, and type or conformation scores are obtained on all progeny. Therefore, observations can be made on the other two traits when selection is made for only one trait. Two additional units of approximately 18 breeding cows each are used as herds to test prospective sires. Superior bulls from these two herds will be used in the above-mentioned herds or for further testing. Bulls from these herds will only be used in the above herds if they are superior to bulls produced in the herds. These studies were revised in 1955 in order that an index herd could be added. Therefore, no data has been accumulated that can be reported.

Progeny testing is being continued with the Angus cattle. The results of these and the Polled Hereford progeny test during the 1955-56 season were as follows:

Breed	Sire number	Number progeny		Rate of gain		Type score		Final rating	
		Bulls	Heifers	Bulls	Heifers	Bulls	Heifers	Bulls	Heifers
P.H.	233	4	5	1.93	1.42	34.41	35.00	73.01	63.40
P.H.	441	8	5	2.43	1.79	35.29	35.29	83.89	71.09
P.H.	452	7	4	2.13	1.81	30.00	35.00	72.60	64.80
P.H.	497	5	5	2.26	1.72	33.24	34.41	78.44	68.81
P.H.	508	5	6	2.29	1.50	37.35	33.53	83.15	63.53
P.H.	1331	5	7	2.01	1.46	33.53	34.71	73.73	63.91
P.H.	34	4*	-	2.40	-	35.29	-	83.29	-
P.H.	10	3*	-	1.80	-	34.71	-	70.71	-
Angus	92	11	11	2.14	1.27	36.18	36.18	78.98	61.58
Angus	JFPE	2	4	1.71	1.28	36.76	36.76	70.96	62.36

\* Owned by local breeder

A study of grading, crisscrossing, and rotational crossing as breeding systems for commercial beef production is being conducted at the State Prison Farm, Reidsville, Georgia. The objectives of this study are:

1. To study the relative value of grading, crisscrossing and rotational crossing as breeding systems for commercial beef production.
2. To study heterotic effects in crosses between Angus and Polled Hereford breeds as compared to heterosis in crosses between these breeds and Santa Gertrudis, a breed based partially on





a Brahman foundation.

3. To study the comparative value of the Santa Gertrudis breed with the Angus and Polled Hereford breeds.

The present cow herd is being used to produce offspring to begin the study. The project was formally started with the breeding of 117 two-year-old heifers during the spring and summer of 1956. The cow herds will be expanded as rapidly as possible and it is hoped that interesting results will be available in the near future.

The Georgia Station is happy to report that the bulletin, "Factors Affecting Performance in Herds of Purebred and Grade Polled Hereford Cattle", has been returned to the printers for final publication. Copies of these should be available in the near future. A copy of the results of Brahman Crossbreeding Studies conducted at this Station has been submitted to the Journal of Animal Science for publication.

## LOUISIANA STATION

Submitted by R. A. Damon, July, 1956

## COMPARISONS OF CROSSBRED AND PUREBRED BEEF CATTLE

## UNDER GULF COAST CONDITIONS

An extensive crossbreeding project was initiated at the Louisiana Agricultural Experiment Station at Baton Rouge in 1952. A great deal of crossbreeding has taken place in the state of Louisiana for many years but since most of the work has been done by private livestock producers, very little information is available as to what crosses are superior and in what respects the crosses are superior. This experiment was set up to measure the performance of several different types of crosses and purebreds, and has been divided into three different phases, which consist of a first cross, back cross, and a three-breed cross. It is hoped that enough concrete information will result from this experiment to be of considerable assistance to livestock breeders in the Gulf Coast Region as well as other regions of the country.

The first cross program has been carried out by the formation of six herds of cows, each herd composed of 8 Angus, 8 Brahman, 8 Brangus and 8 Hereford cows. These six herds are bred to bulls of 6 different breeds: Angus, Brahman, Brangus, Charolaise, Hereford, and Shorthorn. A new bull is selected to represent these breeds each year and the cow herds are rotated and bred to a bull of a different breed each year. In this way, all of the crosses and purebred groups are produced by a different bull and different cows each season. The herds are rotated frequently throughout the year to minimize pasture differences. The breeding plan results in 24 different types of cattle being produced, 4 purebred groups and 20 different crosses.

The fourth calf crop was produced in the spring of 1956 so considerable data have been collected at this time. The results are most readily followed by grouping the records according to the breed of the sire, or the breed of the dam. It is more difficult to follow the 24 groups when discussing several different traits or measurements.

The calves are weighed and ear-notched the day they are born. Table 1 presents the birth weights of the calves grouped by sire and by dam and also the average weights of the ten heaviest groups. The weights have not been adjusted for age of dam. These records have been accumulated over a 4 year period and include 462 weights. The male calves had an average birth weight of 5.30 pounds more than the female calves for the four year period.



Table 1. Birth Weights

Breed of Dam	Av. Birth Weight	Breed of Sire	Av. Birth Weight	Breed of Group	Av. Birth Weight
Angus	67.38 lbs.	Angus	61.69 lbs.	Bra. x An.	83.23 lbs.
Brahman	62.13 lbs.	Brahman	72.75 lbs.	Char. x Her.	81.42 lbs.
Brangus	70.37 lbs.	Brangus	67.52 lbs.	Bra. x Her.	80.83 lbs.
Hereford	73.29 lbs.	Charolaise	73.70 lbs.	Char. x Bran.	76.00 lbs.
		Hereford	68.77 lbs.	Bran. x Her.	72.50 lbs.
		Shorthorn	65.82 lbs.	Bra. x Bran.	72.05 lbs.
				Hereford	71.83 lbs.
				Sh. x Her.	70.67 lbs.
				Char. x An.	70.55 lbs.
				Brangus	70.24 lbs.

Of primary interest in Louisiana are the weights and grades of the calves at weaning time. In order to compare the various groups, the weaning weights were adjusted to 180 days of age. Adjustments were also made for the age of the dam and sex of the calf. The age of dam adjustment that was used was the average of adjustment factors published by several experiment stations throughout the country. The adjustment for sex of calf was estimated from records at this station. The adjusted weaning weights are presented in Table 2, again grouped by breed of dam, breed of sire, along with the ten groups which ranked highest. The weaning weights of three years are included in this table. The heavier

Table 2. Adjusted Weaning Weights

Breed of Dam	Av. Adj. Wng. Wgt.	Breed of Sire	Av. Adj. Wng. Wgt.	Breed of Group	Av. Adj. Wng. Wgt.
Angus	412.42 lbs.	Angus	401.90 lbs.	Sh. x Bra.	479.38 lbs.
Brahman	434.08 lbs.	Brahman	420.10 lbs.	Char. x Bran.	475.00 lbs.
Brangus	450.91 lbs.	Brangus	410.27 lbs.	Char. x Bra.	468.91 lbs.
Hereford	405.48 lbs.	Charolaise	457.50 lbs.	Sh. x Bran.	465.40 lbs.
		Hereford	437.50 lbs.	Her. x Bran.	464.19 lbs.
		Shorthorn	429.56 lbs.	Her. x Bra.	458.89 lbs.
				Char. x An.	446.00 lbs.
				Bra. x Bran.	445.00 lbs.
				Char. x Her.	439.67 lbs.
				Bra. x An.	437.67 lbs.

Weights of the calves out of Brahman and Brangus cows have been very consistent from year to year. The weaning weights of the calves sired by the different bulls have been consistent also in that each year the calves sired by the Charolaise bull have been heaviest and those sired by the Angus bull the lightest. It is noticeable in the crosses that seven of the first ten are out of Brahman or Brangus cows, while two of the remaining three have been sired by the Charolaise bulls.

An inspection of the slaughter calf grades shows some drastic changes from the weaning weight rank. While the calves sired by Angus bulls are the lightest at weaning time, their slaughter calf grades are





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the highest. A tabulation of the grades is presented in Table 3. It can

Table 3. Slaughter Calf Grades<sup>1</sup>

Breed of Dam	Average Slaughter Calf Grade	Breed of Sire	Average Slaughter Calf Grade	Breed of Group	Average Slaughter Calf Grade
Angus	12.13	Angus	12.78	An. x Bran.	14.00
Brahman	12.11	Brahman	12.13	Bra. x Bran.	13.92
Brangus	12.89	Brangus	11.56	An. x Bra.	12.97
Hereford	11.64	Charolaise	12.02	Sh. x An.	12.70
		Hereford	12.40	Her. x Bran.	12.65
		Shorthorn	12.48	Her. x Bra.	12.59
				Sh. x Bran.	12.59
				Brangus	12.54
				Char. x An.	12.54
				Char. x Bra.	12.42

<sup>1</sup>

Slaughter Calf Grades: 17 - 15, Prime; 14 - 12, Choice; 11 - 9, Good; 8 - 6, Commercial

be seen that there is also a change when the grades are examined by breed of dam. The calves out of Angus dams are graded slightly higher than those out of Brahman cows although the calves out of Brangus cows are graded highest. Were consideration given to the age of the dams it is felt that calves out of the Brahman cows would have graded higher, as the Brahman cows were considerably younger than the cows of the other breeds.

Since the heifer calves are retained for further breeding in this project, a study of their growth rate is of interest. Table 4 presents the average weights at one year of age for three crops of calves. The weights are very similar to those for 180 days, with the heifers out of

Table 4. Average Weights at One Year of Age

Breed of Dam	Av. Weight at 1 Year	Breed of Sire	Av. Weight at 1 Year	Breed of Group	Av. Weight at 1 Year
Angus	463.97 lbs.	Angus	480.78 lbs.	Char. x Bran.	561.44 lbs.
Brahman	525.96 lbs.	Brahman	491.84 lbs.	Sh. x Bra.	556.10 lbs.
Brangus	521.12 lbs.	Brangus	470.59 lbs.	Her. x Bra.	554.50 lbs.
Hereford	475.02 lbs.	Charolaise	537.79 lbs.	An. x Bra.	550.17 lbs.
		Hereford	513.33 lbs.	Char. x Bra.	547.43 lbs.
		Shorthorn	494.48 lbs.	Bra. x Her.	530.83 lbs.
				Her. x Bran.	526.00 lbs.
				Sh. x Bran.	522.00 lbs.
				Bra. x Bran.	517.27 lbs.
				Char. x Her.	516.80 lbs.

Brahman and Brangus cows noticeably heavier than those out of the English breeds.





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There are records available of the weights of two crops of heifers up to two years of age. When these weights are examined by breed of sire, it is found that the ranking is essentially unchanged from the weight at one year of age. However, when the data are examined by the breed of dam it is found that while the weights of the heifers out of Angus, Hereford, and Brangus cows are very similar, the heifers out of Brahman cows are considerably heavier than the others. Although only one group of heifers has reached three years of age, the same situation is noticed with the heifers out of Brahman cows outweighing the heifers out of the Angus, Brangus, and Hereford cows by 114, 68, and 53 pounds, respectively.

An important part of this experiment is the performance of the steers. Each year the steers are fed out on a wheat or wheat and rye grass pasture with a supplement of corn and cottonseed meal for a 168 day period. The steers have had an average consumption of about 7 pounds of grain while on pasture. The steers are kept in dry lot for a two week conditioning period after weaning and then put on pasture. A study of the performance of the steers has shown that the weaning weight of the animal has considerable influence on its rate of gain on feed. Therefore, the final weights of the steers were adjusted, by means of within lot regression, to the same initial weight, in order to eliminate as much as possible the differences in gain due to different initial weights. Table 5 shows the adjusted slaughter

Table 5. Adjusted Slaughter weights of Steers.

Breed of Dam	Av. Weight at Slaughter	Breed of Sire	Av. Weight at Slaughter	Breed of Group	Av. Weight at Slaughter
Angus	766.22 lbs.	Angus	761.00 lbs.	Char. X Her.	797.22 lbs.
Brahman	739.55 lbs.	Brahman	757.38 lbs.	Char. x An.	794.69 lbs.
Brangus	744.76 lbs.	Brangus	734.60 lbs.	Bra. x An.	792.93 lbs.
Hereford	785.17 lbs.	Charolaise	778.91 lbs.	Bra., x Her.	792.11 lbs.
		Hereford	759.23 lbs.	Bran. x Her.	789.81 lbs.
		Shorthorn	762.31 lbs.	Her. x Bra.	783.67 lbs.
				Sh. x Her.	779.65 lbs.
				Hereford	774.73 lbs.
				Angus	774.67 lbs.
				An. x Her.	764.67 lbs.

weights of the different groups of steers. When the weights shown here are compared to the 180 day weights, there are some notable differences. The 180 day weights of calves out of Hereford and Angus cows were considerably lighter than those out of Brahman and Brangus cows. However, the adjusted slaughter weights show that the steers out of the English breeds performed much better in the feed lot. When considered by breed of sire the calves sired by the Charolaise bull were considerably heavier with the Shorthorn, Angus, and Hereford calves having very similar weights. When the top ten groups are examined, the preponderance of Hereford and Angus dams in the crosses offers a marked contrast to the top ranked groups at 180 days.

The slaughter grades of the steers are of importance when measuring the performance of steers and Table 6 represents these data. Again, when grouped by dams the steers out of the English breeds of cows are ranked

Table 6. Slaughter Grades of Steers<sup>2</sup>

Breed of Dam	Av. Grade at Slaughter	Breed of Sire	Av. Grade at Slaughter	Breed of Group	Av. Grade at Slaughter
Angus	10.81	Angus	10.86	Bra. x Her.	12.36
Brahman	10.41	Brahman	11.04	Her. x Bra.	12.23
Brangus	10.45	Brangus	9.50	Sh. x Bra.	12.19
Hereford	11.37	Charolaise	10.18	Sh. x Her.	12.14
		Hereford	11.71	Bra. x An.	11.61
		Shorthorn	11.38	Hereford	11.60
				Sh. x Bran.	11.59
				Her. x Bran.	11.57
				An. x Her.	11.46
				Her. x An.	11.35

<sup>2</sup>Slaughter grades: 17 - 15, Prime; 14 - 12, Choice; 11 - 9, Good; 8 - 6, Commercial

higher than the calves out of the Brahman and Brangus cows. When the calves are grouped by sire, the most noticeable point is the low grades placed on the Charolaise steers. It is noticeable in the ten highest grading crosses, not a single charolaise cross appears, even though the Charoliase crosses had the greatest rate of gain on feed. The grades on other corsses correspond closely with their rates of gain on feed.

The steers are slaughtered in the University Meats Laboratory where a great many records are accumulated. Of immediate interest is the carcass grade of the different groups. The carcass grades are presented in Table 7 in the usual fashion. The higher grades of the animals of English breeding

Table 7. Carcass Grades of Steers<sup>3</sup>

Breed of Dam	Av. Carcass Grade	Breed of Sire	Av. Carcass Grade	Breed of Group	Av. Carcass Grade
Angus	12.21	Angus	11.90	Sh. x Bran.	13.02
Brahman	10.49	Brahman	10.58	Sh. x An.	12.94
Brangus	10.43	Brangus	10.09	Angus	12.72
Hereford	11.33	Charolaise	10.04	Her. x Bra.	12.55
		Hereford	11.80	Sh. x Her.	12.39
		Shorthorn	12.72	Bra. x An.	12.29
				An. x Her.	12.20
				Bran. x An.	12.19
				Hereford	11.95
				Sh. x Bra.	11.84

<sup>3</sup>Carcass Grades: 17 - 15, Prime; 14 - 12, Choice; 11 - 9, Good; 8 - 6, Commercial



is very noticeable in all the groups. The grades received by the Shorthorn steers are considerably higher than those of the other breeds. All four of the Shorthorn crosses are included in the ten highest ranking crosses. As with the slaughter grades, the Charolaise steers are shown to be very low. While these crosses grow more rapidly up to weaning and have a greater rate of gain in the feed lot, their gain seems to go toward growth and very little finish is shown by these steers.

Many marketing surveys have been made concerning consumer preference for the different grades of meat. These surveys have shown, in general, that the consumer prefers a cut of meat that has a good deal of lean meat and a minimum of fat. Therefore, it is of interest to examine the planimeter readings of the eye muscles of the different groups of steers, which give an indication of the total lean meat in the carcasses. These data are brought together in Table 8. The particular points of importance

Table 8. Planimeter Readings of Longissimus Dorsi Muscle in Steers

Breed of Dam	Average Planimeter Reading	Breed of Sire	Average Planimeter Reading	Breed of Group	Average Planimeter Reading
Angus	9.05 sq.in.	Angus	8.90 sq.in.	Char. x Bra.	10.31 sq. in.
Brahman	8.74 sq.in.	Brahman	8.84 sq.in.	Char. x An.	10.29 sq. in.
Brangus	9.31 sq.in.	Brangus	8.75 sq. in.	Char. x Bran.	9.94 sq. in.
Hereford	9.05 sq.in.	Charolaise	9.95 sq.in.	Char. x Her.	9.60 sq.in.
		Hereford	9.04 sq.in.	An. x Bran.	9.54 sq.in.
		Shorthorn	8.71 sq.in.	Her. x Bran.	9.29 sq.in.
				Bra. x Her.	9.27 sq.in.
				Bra. x An.	9.25 sq.in.
				Hereford	9.20 sq.in.
				Bra. x Bran.	9.09 sq.in.

in this table are the small size of the planimeter reading for the Shorthorn steers, which had the highest carcass grades, and the extremely large size of the eye muscle of the Charolaise crosses, which had the lowest carcass grades. It is noticeable that the first four crosses in ranking for plantimeter reading are all of Charolaise breeding.

It is to be emphasized that these data are of a preliminary nature, as in some cases the results are based on quite small numbers. However, the consistent results from year to year lend an increasing confidence in the figures presented.





Submitted by Troy B. Patterson  
July, 1956

I. Project Title: A STUDY TO DETERMINE THE BREEDING WORTH OF INBRED AND OUTBRED BULLS FROM VARIOUS SOURCES.

II. Objectives:

(a) To compare the growth rate, carcass qualities and maternal abilities of the progenies of bulls selected from various sources as being potentially superior sires.

(b) To develop a high producing herd of cows by using the progeny of good producing bulls as replacement heifers.

(c) To determine the effectiveness of a selection index when used on heifers at weaning time.

III. Accomplishments:

The calves from 5 bull units representing a total of 154 grade Hereford cows were dropped during the spring of 1955. Three sources of bulls were used: (1) two bulls from Montana Line No. 1; (2) one high gaining bull from the Texas Station; (3) two commercial type bulls currently in use by the Mississippi Station. Data for these calves are presented in table 1.

A second series of bulls consists of: (1) one Montana Line No. 1; (2) one high gaining Hereford from the Texas Station; (3) a polled Hereford from the Georgia Station; (4) a commercial Hereford from the Mississippi Station and (5) an Angus from the Virginia Station. The calves sired by these bulls are now on the ground and the data will be presented in the annual report.

A third series of bulls consists of: (1) one high gaining bull from the Texas Station; (2) one polled Hereford bull from the Georgia Station; (3) three commercial bulls from the Mississippi Station (two Hereford and one Angus); and (4) one Angus bull from the Virginia Station. Calves by these bulls will be dropped in the Spring of 1957.

Feeding and grazing tests on which the 1955 calves are being tested for post-weaning gains have not been completed at this time. However, preliminary results do not indicate that this will be a satisfactory method for evaluating sire differences.

Replacement heifers were selected from the 1955 calf crop. These heifers were utilized on certain winter maintenance feeding experiments and were then placed on summer pasture. Summer gains will be used to determine any differences that may exist between sires.

IV. Future Plans:

Winter grazing will be provided for all calves used on progeny tests from the 1956 calf crop. All calves will be grazed under uniform conditions.

An effort will be made to secure bulls for future studies from sources other than those already in use.

TABLE 1. PERFORMANCE OF COW HERDS. 1955 CALVES

Mississippi Station

Line or group designation	Mont. #1 (394)	Mont. #1 (481)	Texas . (828)	Comm. (EN 16)	Comm. (EN 45)
Location	<del>Prairie</del>				
Breed of sire and dam	Hereford	Hereford	Hereford	Hereford	Hereford
No. cows bred	26	34	31	33	30
No. cows calving	18	31	24	25	23
No. calves raised	17	31	22	24	23
Av. Birth date	3-12-55	3-15-55	3-11-55	3-12-55	4-8-55
Av. birth wt. (lbs.):					
Bulls	72	69	62	68	72
Heifers	62	64	65	61	66
Were calves creep fed?	No	No	No	No	No
Av. weaning date (all calves)	11-10-55	11-10-55	11-10-55	11-10-55	11-10-55
Av. weaning wt. (Corrected to average age):					
Steers	450.1	427.3	417.1	412.2	431.8
Heifers	415.2	401.7	402.0	402.5	404.2
Av. weaning type score: <u>1</u> /					
Steers	10.9	10.8	11.2	11.2	10.9
Heifers	10.8	10.8	11.2	10.9	11.1

1/ Type grades used:

6-8 -- Medium  
9-11 - Good  
12-14 - Choice



## NORTH CAROLINA STATION

SUBMITTED BY E. U. DILLARD, JULY, 1956

The work at the North Carolina Agricultural Experiment Station has emphasized two major areas of work. The first of these is that carried on under State Project S-74 "The Improvement of Beef Cattle through Breeding Methods" which is primarily concerned with the development and evaluation criteria for the improvement of beef cattle. As a part of this research, weights and body measurements are taken on all purebred cattle at regular intervals, purebred heifer and bull calves are put on post weaning gain tests and progeny performance is obtained on selected gain tested bulls. Grade herds are used in sire evaluations to study reproductive characteristics and to evaluate progress made through selection.

In 1956 the Experiment Station and the Extension Service placed in full operation a production testing program with cooperating farmers. The program is designed to evaluate the productivity of sires and dams upon the basis of weight and grade of calf at or near weaning time. Weights and grades will be obtained on all calves and selling price will be obtained on those from co-operator herds sold through state sponsored feeder calf sales. Replacement heifers will be evaluated periodically as long as they remain in the herd. The major deviation of the North Carolina program from others is that a bracketed standard age is being used. All calves are weighed at least twice within a month of the standard age.

A second major area of work has as its first objective the development of cattle especially adapted to the hot, humid coastal area of North Carolina. Breeds being used in this phase of the work include Africander, Brahman, Romo Sinuano, Hereford and Angus. At the present time small herds of Brahman-Hereford, Africander-Angus-Hereford and Romo Sinuano-Hereford are available for study.

## RECENT RESEARCH

A. Influence of age of dam and sex of calf upon  
six months weight of calf.

Research work conducted at the North Carolina Agricultural Experiment Station (Godley, 1955) as well as work at a number of other stations has shown that some of the most important sources of variation in weaning weights of calves are age at weaning, age of dam, sex of calf and season of birth. Several stations have reported adjustment factors for age of dam and sex of calf. The use of a standard age weight for removing age differences has also been proposed. Many of the investigations have been conducted with range cattle and adjustments for them may be quite different from those for farm operations. The use of adjustment factors for making selections is important and as new information becomes available for improving present corrections it should be utilized to the fullest extent.

Data for a study on the effect of age of dam and sex of calf were available on over 400 calves born in North Carolina Experiment Station herds from 1951-1954, inclusive. For determining sex effects on 182 day weights the weight difference between steer and heifer calves within age of dam, sire and herd was used. The pooled estimate of 13.7 pounds obtained is somewhat less than that reported by Godley working on data taken for previous years in the same herds.



-2-

For determining the age of dam effects a curvilinear regression analysis was used. The graph below indicates the general trend with weight of calf increasing with age of dam up to eight or nine years of age and then declining. This age is somewhat older than that most often reported in the literature but may reflect the more favorable farm environment as compared with range conditions. One item of interest in this analysis is that as weight of calf increases with age of dam the sex difference also increases. Previous work has also shown that sex differences are greater when a weaning age of 210 days is used as compared to 180 days or less. The regression curves for age of dam on weights of steer and heifer calves are shown in Figure 1.

B. Evaluation of selection practiced for weaning weight in a grade Hereford herd.

In 1926 the North Carolina Agricultural Experiment Station established at the Blackland Station in the Tidewater area of the state a herd of native cattle which were about as undesirable in size and conformation as could be found in the region. Until 1932 both "native" and purebred Hereford bulls were mated with these native cows to study the value of purebred sires for beef production. Beginning in 1933 and continuing to the present only purebred Hereford sires have been used in the herd in a grading up process. Many of the cows in the herd today represent five generations of matings to purebred sires. No specific selection criteria were mentioned in the original project other than that a process of selection and culling would be followed with the best of the females retained as breeders.

A study was made to determine the amount of selection which had been practiced for weaning weight since 1933 and how much selection would have been possible if only the top end of the heifers had been kept as replacements. Of the 32 "Native" cows in the herd in 1933, 28 of the original purchase and five had been produced in the herd. The 1955 herd was comprised of 50 cows that traced through direct line to only 14 of the original group.

The superiority of selected heifer calves over the unselected population from which they were chosen was calculated for each year by subtracting the average corrected weaning weight of all heifer calves weaned each year from the average corrected weaning weight of the heifers that were saved and produced calves. Table 1.

The accumulated genetic gain of the Tidewater herd was measured by summing the selection differential (difference between the weaning weight of the heifer that contributed to the herd and the average weaning weight of heifers born that same year) of all direct line female ancestors. By including the selection differential of the dam, grand dam etc., full credit is given for genetic gains or losses made in prior generations. The average genetic gain for the herd was obtained by summing all the accumulated selection differentials for each cow in the herd, then dividing by the number of cows.



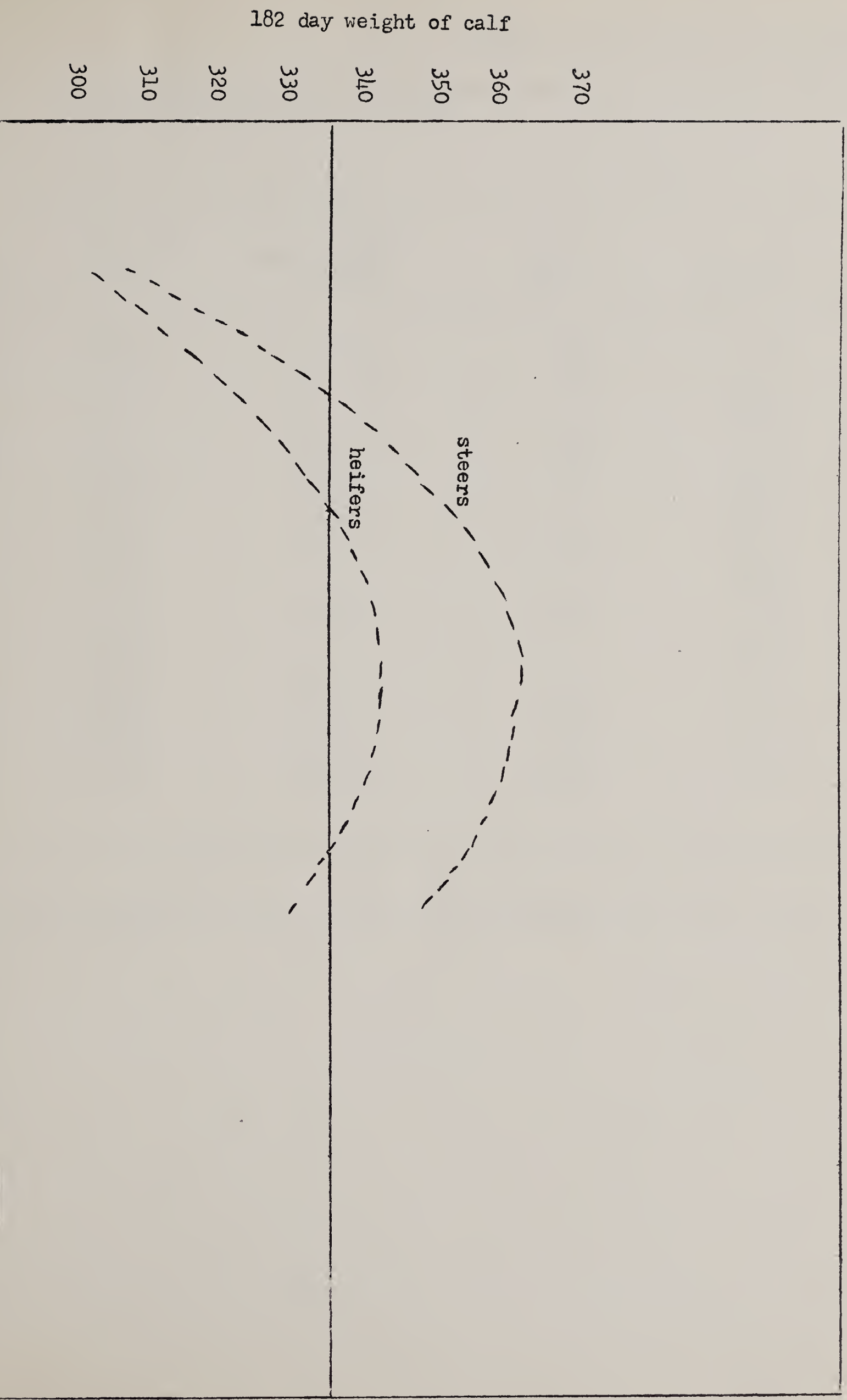


Figure 1. Influence of age of dam on 182 day weight of calf





Table 1. Genetic superiority (G.S.) of weaning weight for replacement heifers over all heifers weaned each year.

Years	Avg. wgt. all heifers	Avg. wgt. replacement heifers	Selec. diff.	G.S. <sup>1/</sup> Expected
1933	264.63	260.38	- 4.25	- 1.06
1934	357.50	358.33	.83	0.20
1935	319.62	311.33	- 8.29	- 2.50
1936	327.50	-	-	None
1937	341.37	351.00	9.63	2.40
1938	343.72	346.37	2.65	0.66
1939	322.88	329.26	6.38	1.60
1940	333.90	333.90	0	None
1941	335.27	333.40	- 1.65	- 0.42
1942	325.60	324.21	- 1.39	- 0.34
1943	331.61	-	-	None
1944	320.28	325.81	5.56	1.38
1945	317.50	335.80	18.30	4.58
1946	326.61	-	-	None
1947	300.90	300.90	0	None
1948	261.17	272.14	10.99	2.74
1949	289.86	288.80	- 1.06	- 0.26
1950	259.21	268.18	8.97	2.24
1951	279.95	286.33	6.38	1.60
1952	309.94	325.09	15.15	3.78

<sup>1/</sup> Genetic superiority equals the selection differential times the heritability (0.25).





Table 2. The difference between the genetic improvement possible by saving the top ranking 40 percent of the heifer crop and the genetic improvement expected from heifers actually saved each year in the Tidewater herd.

Year	Genetic Improvement possible	Expected Genetic Improvement	Difference
1933	4.74	- .53	5.27
1934	7.81	.10	7.71
1935	5.72	- 1.25	6.97
1936	2.05	-	2.05
1937	3.35	1.20	2.15
1938	2.80	.33	2.47
1939	3.55	.80	2.75
1940	3.04	-	3.04
1941	3.07	- .21	3.28
1942	4.75	- .17	4.92
1943	3.02	-	3.02
1944	4.06	.69	3.37
1945	5.48	.2.29	3.19
1946	10.05	-	10.05
1947	3.11	-	3.11
1948	4.41	1.37	3.04
1949	6.04	.13	6.17
1950	2.94	1.12	1.82
1951	3.39	.80	2.59
1952	4.90	1.89	3.01





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Another criterion of progress is the average weaning weights of the calves of cows that were kept each year to produce the next calf crop as compared to the average weaning weight of all calves produced. This shows the superiority of the weaning weights of cows saved each year over the weaning weights of cows culled each year.

The small genetic gain shown reflects the progress made in selecting cows to produce cows. There are four possible ways in which genes may be transmitted to the next generation, (1) bulls to produce bulls, (2) bulls to produce cows, (3) cows to produce bulls, and (4) cows to produce cows. This study has not considered the contribution from the sires. The fact that the cows in 1955 are far superior in beef type and conformation to the native stock undoubtedly is due to the use of purebred Hereford bulls in this herd since 1933.

Most of the selection realized with respect to both dams and replacement heifers for the first fifteen years was natural selection. The average accumulated selection differential for the herd for the period studied was 7.34 pounds. Five generations were represented in the period covered, giving an average accumulated selection differential of 1.47 pounds per generation. This represents a probably genetic gain for the twenty-three year period of 0.92 pounds resulting from selection of the dams of herd replacements.

The major limitations to the genetic improvement that can be made when selecting solely among females must be considered. First, since at least 40 percent of the heifer crop is needed for replacements, the genetic superiority of the females chosen for herd replacements is not much above the genetic mean for heifers. Secondly, the heritability of weaning weight is moderately low. If only the top 40 percent of the heifers weaned in this herd had been saved, the probably genetic gain for the twenty-three year period would have been 4.45 pounds rather than 0.92.







